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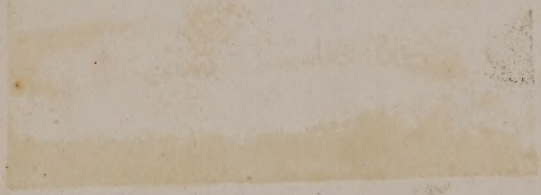

S. Oakley Vanderpool
Albany

ON

CERTAIN OF THE DISEASES

OF

YOUNG CHILDREN.

J. Oakley Brandeford
1857

OBSERVATIONS

ON

CERTAIN OF THE DISEASES

OF

YOUNG CHILDREN.

BY

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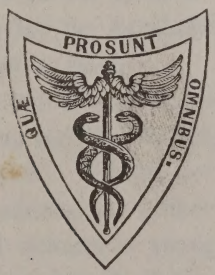

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PREFACE.

The courses of public lectures in the Jefferson College have for many years opened on the first Monday in November.

At the last session, held in 1849–50, the lectures commenced at the middle of October, on a plan which will probably be for the future adhered to in that institution.

In October, 1849, as a considerable number of students had already assembled, I engaged to address to them several preliminary Lectures on the subject of children's diseases. The following pages contain the substance of what I then said to the Class who honored me with their attendance.

Inasmuch as the regular business of my professorship was to commence on the first of November, and as the chief object of my appointment is to give instruction at that College on Obstetrics, I felt obliged to break off the series of remarks on disorders of children, in order to lay the foundations of such doctrine on Midwifery as I proposed to teach.

In the course of the winter session, there was no further opportunity for me to take up seriatim the subject which I had opened in the month of October. I desire not to be misunderstood, as saying that I did not address any further remarks to the Class on the management and sickness of young children. I have considered it as a part of my duty, in all the courses I have delivered at the College, to take frequent and all available occasions to treat both of children's disorders and those of women.

But inasmuch as the opportunity I enjoyed in October, 1848, enabled me to speak more especially without reference to Ob-

stetrics or Midwifery, I have supposed that I might do a service, not unacceptable to my students, by printing this small volume, which I beg leave to dedicate to them.

I hope that such of them as may meet with it, will remember the hours of their student-life passed with me in the consideration of these topics; and that, if they then took any real interest in the views I presented to them, they may be pleased to find those views more clearly expressed in these pages.

To the medical public, I beg to say that these observations on certain of the disorders of young children make no pretension as a systematic work. Indeed, I have not indulged any intention to make a systematic work on the subject, seeing that the place is already occupied with numerous valuable books, presenting a complete body of doctrines on children's diseases.

To that medical public, which has claim to my heartfelt gratitude for the kind reception of other works of mine, I humbly present these observations, hoping that some of my suggestions as to theory and practice in the cases, may not be destitute of both interest and usefulness.

CH. D. MEIGS,
324 *Walnut street, Philad'a.*
Aug. 23*d*, 1850.

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ON

CERTAIN DISEASES OF CHILDREN.

CHAPTER I.

It is incumbent on me, as a Professor in the Jefferson Medical College, to deliver Lectures on the diseases of children, which is considered an important department of the professorial chair. It is an important one, on account of the supposed difficulty of the subject; and still more so, on account of the vast number of patients, in the class of young children, that come under the care of a medical man in the course of his career. Moreover, it is important, as involving the interests and the feelings of families, as well as of the public in general. The disease of a young child, it seems to me, is by some looked upon as a matter of less moment than the disease of an adult; and yet the life of a young child is equal in value to that of a grown man. Children are the inheritors of the whole earth: men are mere present possessors and custodians, holding it for the use and in behalf of the children of the family, which may consist of six persons, a father, a mother, and four children. It is of the diseases of children that I am about to speak.

Those who would be physicians, must have more to do with children, than with men or women: there are probably at this moment, five hundred millions of children in the world; it is even probable that the number may amount to six hundred millions. Twenty-four millions are born every year, and far more than one-half the annual mortality in the world, is among children under six years of age; hence, the interest, the prosperity, the usefulness of the physician, are intimately connected with his knowledge of the diseases of children.

But this knowledge is generally deemed a very difficult and unsatisfactory branch of medical acquirements;—Bouchut says so in his 93d page. It is unsatisfactory to the public, because the public will not believe that physicians can understand the diseases of children as clearly as they can understand those of adults.

It is certainly a very prevalent sentiment, even among the more intelligent portion of the community, that to put a young child into the hands of the physician, is to expose it to a considerable risk; they call the physician because they have no one else to refer to,—they often call him distrustfully and doubtingly,—often, the doctor is a *pis aller*, when a child is sick. I don't assert that this is universally the case; for there are many intelligent people who know that the physician knows what he is about, and there are millions of credulous persons who believe implicitly even the audacious lies of the most unblushing quack, and swallow his nonsense and his drugs with equal appetite.

It is supposed, by the public, that the physician cannot understand the diseases of children because children cannot speak or explain their sensations. But, a knowledge of the diseases of childhood is not more difficult to obtain, than that of the maladies of adult persons, because, in either case, the medical man relies on his own observation, and not upon statements he receives. The opinions of a patient in regard to his own case, as to the diagnostic, or as to the therapy, are, for the most part, utterly indifferent in the mind of the physician: he does not ask a patient's opinion in the diagnosis of a phthisis, of a hydrothorax, of an endocarditis, of a pleuritis, of a typhoid fever, of an exantheme, of a neuropathy, &c. When he seeks to find out their nature and seat, he interrogates the organs; he knocks at the door of the functions, and they admit him to see for himself; he inquires of them, and they have voices to answer him; for there is a language of the organs, and the functions speak with tongues, and the speech is plain, direct, vernacular, true—for it is the voice of nature that speaks, and nature cannot lie. But, the speech of man is a human invention, full of imperfections, full of double meanings, often directed by a false heart, or a misapprehending reason;—men say there is pain, when there is no pain; or they say there is no pain, when there is intolerable anguish; men say they are sick here, when, in fact, they are sick elsewhere. They know not where they are sick, nor how; it is the physician's affair to find it out.

"How do you do, to-day?" said I to a lady.

"I am very sick, indeed, doctor."

"How are you sick—where are you sick?"

"I have had a terrible chill, which made my teeth chatter together, followed by fever, violent headache, pains in the back and limbs, and unappeasable thirst; I am dreadfully ill."

"Have you pain in the abdomen?"

"No."

"Have you any pain in the thorax?"

"No."

"Pain in the great joints?"

"No."

"Have you not a lump in your breast?"

"No, I have not."

"Yes, you have."

"Indeed, I have not."

"No," says a witness,—"I have examined it with the greatest care."

"When was it examined?"

"Just now."

"Will you let me examine it?"

"Yes."

"Well, then, does not that hurt you?" I touched the breast.

The answer was an outcry; she had a lump in her breast; she had a *weed* in her breast, and did not know it. Suppose she had been dumb and deaf—would there have been any bar to my diagnosis in her surdmutism?

A friend of mine had lodgings for the summer, twenty miles from the city; his daughter, two years old, was seized with a fit of inextinguishable crying; she screamed all the time that she was awake.

On the morning of the second day, as her distress continued, he became much alarmed, and resolved, accompanied by his lady, to bring his child to me. They arrived at their city residence, and sent for me by an urgent messenger. I heard the child's voice from the third story, while I was in the lower hall. My friend began to explain the nature of the case, and to set forth all his alarm for his dear daughter. I stopped him, saying, "I hear her crying now, do I not?"

"Yes, that is her voice; she is in the greatest distress."

"She is crying with an ear-ache," said I.

"Ear-ache! How do you know that, doctor?"

"Come with me to the nursery, and I will prove it to you," said I; "I know the voice of the ear-ache."

When we came into the room, the child, surprised by my presence, ceased for a moment to scream. "Now," said I, "see if I don't prove to you that she has an ear-ache." I approached her, and putting the palp of my thumb on the right meatus auditorius, I suddenly pressed the cartilaginous tube inwards upon the ear;—the child merely looked surprised at my rudeness; she did not cry. "It is not the right ear," said I. I next repeated the same movement as to the left ear, and she screamed as if she would go into convulsion. "There," said I, "I have hurt her ear for you, by a slight touch, and she cries with the same voice that I heard when I was down stairs; I knew that it was the ear-ache then, and I am sure of it now,—this touch is the diagnostical test." The cry was a test.

If a child have a disease of its lung, which makes it cry, it is probable that the cry will be modified by the modification of the respiratory movement involved in the pulmonary disease; and therefore, the pulmonary cry will be a peculiar cry. Such a cry will be very different from that occasioned by a flatulent colic, or by a griping of the bowels; because, the cry of distress from a troubled intestine does not necessarily involve any modification of the respiratory act; therefore, the cry will be different. The same is true with regard to the phonic expression of cephalalgia, or head-ache. The child with ear-ache may cry for hours, one with a pulmonary pain will scarcely utter sharp and protracted cries of distress. With a pain in the head, there will be an occasional scream, short, sharp, and quick. The cry of a suffering intestine is loud and prolonged, with frequent intervals of rest; the mouth and throat are opened wide, so as to utter the loudest sounds. A child with a pain in a great articulation, will utter a cry occasionally only, which will coincide with some spontaneous or forced motion of the joint.

A young child suffering with strong pain in the urinary bladder, or the lower part of the rectum, will express the distress with a peculiar cry; in like manner, it will tell if the pain is in its lung.

A gentleman having an only son, some three months old, came

to tell me that his child was sick. He had already had the misfortune to lose two children, and had very little faith left in doctors. Said he, "my child is very sick, and I wish you to come and see it;" adding, "if you think it is worth while. You know," said he, "that with regard to the complaints of young children, it is all guess work; for they can't explain anything." "Guess work!" said I; "I feel more at home in asking the child what is the matter with it, than in asking you what is the matter with yourself. I can always know what is the matter with the child, for it never misleads me, but men and women constantly mislead me or endeavor to do so." We went to see the young child,—a beautiful bright young baby, lying upon a pillow, upon its nurse's lap. The patient appeared to be in consummate health, and perfectly happy and contented. I was told that the child was, to all appearances in good health, save in this, that when it was necessary to change its diaper, it invariably screamed so violently, as to alarm them. I examined its physiognomy, its pulse, its respiration, its temperature, its coloration, the state of its epigastrium, and hypochondrium; its umbilical and hypogastric regions, without discovering any signs of indisposition in any of them; the bowels were regular, and the appetite good. The napkin was taken off, and in the act it screamed,—a sudden, sharp, impatient cry of the keenest distress; but, as soon as it was left to itself, it became complacent again, and as happy as a bird. I now took hold of its left foot as it laid upon its back upon the pillow, and flexed its leg upon the thigh, making the heel touch the buttock, and I flexed the thigh upon the body. I flexed and extended by turns the foot, all parts of it, and compressed the limb from the hip to the foot, which gave the child not the least uneasiness. I rotated the limb inwards and outwards, strongly, without distressing it. "The malady," said I, "is not in its left leg." I now took hold of the right foot, and flexing it strongly, pressed the thigh against the belly, and then extended the whole limb without giving the child any pain. I flexed the leg upon the thigh, making the heel touch the buttock, but it gave no pain,—but when I held the thigh at right angles to the body, and then attempted to extend the leg, I gave it the most acute pain, which ceased as soon as I let it alone.

Said I to the father, "when I extend the leg upon the flexed thigh, the child has pain; the pain is in the synovial capsule of

the knee-joint,—it is articular disease; and as there is no visible swelling, nor symptom of bruise about it, I shall suppose that it is an arthritic disease; I suppose that it has taken cold, and has a slight rheumatism of its joint. Do thus and so, and in a few days the child will probably be well." My orders were obeyed, and I had no further trouble with it.

Here, then, nature spoke the truth,—here was a language of the organs. The brain speaks, the lungs, the stomach, the bowels, the teeth, the joints, the marrow, the organs of the senses,—each has a language of its own,—so that the body may be compared to a great polyglot, since so many organs as it hath, so many vernaculars hath it.

There is a rich mine of diagnoses in the physiognomical expressions of the human face, but no man can write them;—an artist may paint, but no printer can print them; he that would possess the wealth of such treasures, must dig for them himself in the clinical mine. One may look through the eyes down into the soul, into the most intimate life-cell, and read its expression there; because the cerebro-spinal axis and the ganglionic nerves often express their patible conditions clearly and plainly through the eyes. The whole temper of man, moral and intellectual, as well as physical, is written in legible characters upon his countenance. There is nothing more common among men than to trust, or abhor their brethren, upon the faith of their physiognomical expression as to intelligence, as to probity, as to purposes. In like manner, his health and security, and his prospects as to life and death, are discoverable by a glance at his face, gesture, or decubitus.

I would rather ask questions as to its health, of a baby a month old, than of its mother; the mother will be very apt to say, if it have fever, "its head is as hot as the burning fire coals;" but the child's head says it is merely rather warm. The touch of its skin has told me the truth, as relates to its calorific function; if it were in plain English to tell me how hot it is, it might perhaps say as its mother did, "as hot as fire," but, my perception of the rate of its calorific function, since it cannot speak, will not be modified by any respect for the speaker,—I shall perceive its true rate, without exaggeration or diminution of its intensity.

The mother will say that the child is dreadfully oppressed in breathing; but, when I count the number of its respirations per minute, and when I see that they are full and ample, or imperfect

and incomplete,—when I compare the rate of its respiration with the effect of its respiratory function in developing its animal temperature, its color, its innervative force, I appeal to a source of information which cannot deceive me, for it is not a human intelligence which tells me of the fact,—a human intelligence swayed by motives, biassed by emotions—but I hear the voice of nature speaking to me, and showing me in the rate of the functions, the state of the functioning organs. And so, with regard to the functions of all the noble parts of the body,—one may read them in the book of nature that lies open before him, without referring to the ignorant impressions of a bystander whose relation of the case, is, like a lawyer's brief, too apt to make the wrong the better reason.

But we are speaking of the diseases of children, and we may ask the question—who are children? All children; children in the womb are children: and their mothers speak of them as if they knew them to be children—"the *child* moves"—"the *child* is restless"—"the *child* is asleep"—"there must be *two*"—"I do believe I shall have *twins*." Now in using these words, she admits that the unborn of the womb are children, and, indeed, they are often sick children; they are children wounded; they are children dying, and needing the aid of a physician, and depending on his skill and judgment for their rescue. They require his care, and it is his duty to be the conservator of their health, conducting them through the narrow portals of existence, and placing them securely upon the great stage of the world.

The life of the child in utero is always different from that of the respiring child, the breathing child; its wants are few, and its sources of supply for those wants are scanty and limited; they are contained within the area of the placenta. It can scarcely require more than that which is necessary for the development of its organic existence; it has no motive nor ability to exercise its prehensile power, its locomotive faculty, its vision, its audition, its olfaction, or its gustation; and if its tactile sense be really the most active of its senses, it is yet true to say that even its tactile sense must be dull and obscure, since the paucity of its material for oxygenation, renders it impossible for the unborn child to possess an active and vigorous intellectual perception. The quantity of oxygen which the child may be supposed to be capable of taking from the placental superficies of the uterus, by

whatever means that transfer may be made, is but a small quantity; but, be it great or small, the healthful condition of the noble parts, and of the ignoble parts of the child's constitution, must be greatly modified by whatever may serve to increase or diminish the quantity of vital air imparted to its blood.

Children in utero, are the frequent subjects of diseases that destroy them before they are born, and which it is interesting to know, because cases occur in which a discovery of the cause of death of the still-born, may be of great consequence to the peace of families, or of individuals. It is perhaps of little moment for us to know that a child in utero may be the subject of a tertian fever. Indeed, it is scarcely certain that we can know it, since it is only after its birth that we can become acquainted with its real condition. True it is, that by means of the stethoscope, we may auscult the heart of the unborn child; we may find that the frequency and impulse of the cardiac action is greatly augmented, and even that it begins to be so at a time fixed, and that the recurrence of the phenomena is subject to a law of periodicity. Dr. Graetzer takes it for granted that children may suffer from intermittent fever, and seems to rely upon the report of a case that fell under the clinical observation of Fernelius: it was that of a woman laboring under a quartan fever, who gave birth to a child, which not long afterwards was seized with a quartan. But such an occurrence does not prove that the infant was affected with the disorder while in its mother's womb.

As little faith ought to be placed in another example that he cites from Paulini, in the *Ephem. Nat. Curios.*, of a Mad. Meissenthurm, the wife of a soldier, who had a quartan in the second month of pregnancy, and who, in the latter periods of utero-gestation, clearly perceived, as her paroxysms came on, that the child became restless, trembled, and moved itself from side to side. After its birth, it was seized with quartan paroxysms at the same hour that its mother's attacks returned, and continued to do so for a long time.

Such information is barely inferential, it cannot be positive, and is only useful after the fact, if at all.

That a child in utero may be the subject of small-pox is undeniable, but to know it before the birth, is of little advantage, since the knowledge is inapplicable to the fulfilment of any therapeu-

tical or chirurgical indication. The case must ever be uncertain until the birth.

I have seen a child born while the mother had a forming eruption of violent small-pox. It seemed to be in good health, notwithstanding the intense variolous fever of the parent. I vaccinated it immediately, and it took the breast, which had many pustules upon it. The vaccine disease passed regularly and favorably through all the usual phases, and no inconvenience was experienced by the young infant from having been imprisoned in the womb of a mother who had for several days been the subject of so terrible a malady. This case shows that we cannot know, *ante partum*, whether the child is attacked or no. Some children have had the eruption while in the womb.

As to any therapeutical advantages to be derived from a study of the intra-uterine diseases of children, I am unable to speak. It is enough for us to know that they are sick, and dying or dead.

There are women who lose the child in the womb, in consequence of imperfect development of parts belonging strictly to the child, or from the imperfect development of parts that are accessary to the child's nature and wants.

The child is contained in the womb, whose parietes are protected against its contact by the double membranes of the ovum, to wit, the chorion and the amnion, as well as by the caducous coat of the uterus, so that when it moves in the womb it touches it not; it touches only its own amnion, the impulse being conducted through the chorion and caduca to the sentient paries of the womb itself; the child, in fact, touches no part of its mother except by its blood:—the remark has often been made that the blood is the flowing flesh. Oken says, that the blood is the fluid body, and the body is the fixed and rigid blood. Well, the child places its fluid body, if Oken's idea be correct, in contact with the fixed or rigid blood of its mother, in order to take from her the materials for the augmentation and perfection of its blood, whereby it may, more surely, carry on its own proper development.

It is principally to circumstances connected with the state of the child's blood that the attention of the physician is, and must be turned, since he can by no means have access to the body of the child, whereby to discover methods of influencing that body as such, but he can modify the blood of the child by modifying the

health of the parent; and he is capable, in many instances, of ascertaining that the child's blood is undergoing strange modifications from the modality of its mother, and from modifications of her functional forces. He knows, that if the mother live in an impure atmosphere, or have a diseased lung; or if the mother have a disease of the nature of a cyanosis, the child whose blood touches hers, cannot probably derive from her vitiated blood a due amount of the vital air of it, and as a wise physician, he will modify her condition by sending her into a better air, by curing her lung, by correcting her cyanotic malady with a view of saving the unborn child in the womb. Again,—in the treatment of labors, the physician will consider himself a person appointed to take care of the health and security, not of the mother alone, but that of the child also, and he will carefully supervise the condition of its health in the only way in which he can possibly have any cognition of its state—to wit: by auscultation of its heart through the muscular and other integuments beneath which it is concealed. He knows that the child's heart, at or near the term of utero-gestation, beats more or less unsteadily, and that the number of pulsations will be found to range between one hundred and thirty and one hundred and fifty beats per minute. By means of his auscultation he is fully enabled to determine the question as to the symmetrical innervation of the heart, because he will be enabled to ascertain whether the first and second sounds follow each other with a perfect rhythm, or whether they are asymmetrical, as in palpitation of the organ. If the physician knows that the placenta of a child is, and has been, during a certain space of time in a labor, subjected to the unmitigated pressure of her uterus, compressing it without the intervention of any of the waters, against the superficies of the child's body, his auscultation will teach him whether the pressure is dangerous in degree or in duration, and he will take his measures, accordingly, to rescue the child from such danger. He will, perhaps, have read the following case, interestingly related by that intelligent physician, Dr. Evory Kennedy, in his work on obstetrical auscultation.

"A woman came into the lying-in hospital, in labor of her second child. On visiting her at two o'clock, A. M., she was found to be suffering from an acute attack of pleuritis, with great general irritation and difficulty of breathing; her pulse was hard and full, and as frequent as one hundred and forty in the minute. On applying

the stethoscope to the abdomen, the fœtal heart's action was perceptible over a considerable space of it, extending across the whole hypogastric into the inferior part of the umbilical and lumbar regions, beating about *one hundred and eighty* in the minute.

"The placental *souffle* was only audible at a small spot, in the left inguinal region, corresponding in frequency to the maternal pulse at the wrist. Having determined on bleeding the patient, I was anxious to observe what effect the sudden removal of blood would produce on the fœtal circulation. When about eighteen ounces were abstracted, the mother's pulse became softer and more frequent, beating *one hundred and fifty* in a minute; and now the fœtal heart's action also appeared full and strong, and came down to *one hundred and fifty*. The blood continued to flow, but not in so full a stream as I could have wished; however, this could not be remedied, as the gentleman who operated found considerable difficulty in opening a vein. She experienced no relief from the pain and difficulty of breathing, until upwards of twenty ounces were removed, when, although deliquium was not produced, yet the maternal pulse was much affected, rising to *one hundred and seventy*, but devoid of all that inflammatory character which it before evinced, being soft and weak. The arm was now tied up, and on applying the stethoscope again, to examine the fœtal heart, it was found very sensibly altered; indeed, still quite distinct, and only beating *ninety-two* in the minute. Having kept my ear applied to the cylinder for some minutes, during which time the patient was very low, although she had no actual syncope, I observed the fœtal pulsation to vary; one minute being *ninety-two*, next rising to *one hundred*, and again to *one hundred and twenty;* and in this way it ranged for some minutes, until the patient had fully recovered from the effects of the bleeding, when her pulse descended to about *one hundred and thirty*, that of the fœtus ascending to *one hundred and thirty-five*. It now continued between this and one hundred. The number of beats varying every two or three minutes, for half an hour, when it *ceased altogether*. At 9 P. M., the woman was delivered of a dead child, exhibiting a livid discoloration of the skin, like that of an individual drowned or hanged."

This case by Dr. Kennedy, shows, I think conclusively, that the state of the circulation of the mother may exert a powerful influence upon the life of the child, and it might readily be con-

ceived that sudden and great derangement of the maternal circulation would probably affect more injuriously the life of the fœtus in utero, than would be the case should similar and equal derangements take place by slow degrees; for it is very true that the life powers accommodate themselves to strange conditions, when they are brought about gradually, which they will in no instance submit to if instantly or suddenly produced. In Dr. Kennedy's patient there was not only excessive derangement of the sanguine circulation, but there must have been considerable diminution of the functional force of the lung, brought about by the pleuritic inflammation, of which she was the subject; both of these circumstances must be considered to have the power to modify the state of her blood as an oxygeniferous material. If to such circumstances there should be superadded the almost total cessation of the innervative forces, coincident with the lypothymia of which he speaks, there is no reason to be astonished at the death of the child, or of the phenomena presented by it after its expulsion; and "a livid discoloration of the skin like that of an individual drowned or hanged" is the sure evidence of its having perished by an asphyxia. The feeble source of oxygen supplied by its placenta became wholly insufficient to endow its blood with the requisite proportion of vital air, whence arose the unsteady action of the heart and its gradual decadence in force and frequency down to the last extinction of the beat.

I remarked just now that an equal disorder of the blood as to its oxygeniferous qualities gradually brought about, is less likely to prove destructive to the infant in the womb, and I found this opinion upon the observation of several cases that have fallen under my clinical notice. I have the strongest impression of the case of a Mrs. Goodwin, who was under my care here a few years since, and who, laboring under an attack of laryngeal phthisis, suffered erosion or ulceration of the larynx to such an extent as to give rise to a most extraordinary emphysema, produced by the escape of air, in the act of expiration, into the cellular tissue outside of the ulcerated larynx; an emphysema so terrible that I found it expedient to make many punctures upon the thorax and also upon the wrists in order to dissipate the emphysematous inflation. The patient, contrary to the expectation of all her friends, —in the extremest emaciation—with the most distresssing dyspnœa and cough, struggled against the causes of dissolution until

the birth of her child, shortly after which she sunk and expired. I was amazed to find, upon the birth of the infant, that it was in the rudest possible health, and that it weighed in the scale upwards of ten pounds avoirdupois—issuing into the world redolent of life, and escaping, as it were, from the sepulchral cavity of its dying mother's womb.

I presume that no doubt can be entertained as to the fact that etherization, as a means employed for the diminution of the pains of labor, if carried to a certain extent, must modify the oxygenating powers of the lung in respiration; that is to say, it can to a certain degree, and indeed it can totally, suspend the power of the lung to breathe upon the blood and endow it with oxygen. For my part, I cannot conceive that even slight suspension of the powers of the brain can be brought about by ether or chloroform without changing the hue of the arterial blood, giving it somewhat the properties belonging to the venous side of the circuit.

The numerous experiments that have been reported to the Royal Academy of Sciences, at Paris, particularly those of M. Flourens on various animals, and the still more numerous and various trials of ether and chloroform made and reported by Mr. Wackley, in the Lancet for Dec. 25, 1848, afford irrecusable proofs, that to continue the etherization up to a certain point, is to arrest the sources of innervations as to the par vagum. Such an arrest is death, for when the medulla oblongata, from which both the sensitive and motor cords of the pneumogastric take their origin, is suspended of its power by the influence of the ether, death must be the consequence, since, with the cessation of the respiration, there can be no further oxygenative process in the body, and the whole brain and all the sympathetic arches, all the ganglia and plexuses, must cease to exercise influence over parts of which they are the administrators, and for which they are the evolvers of life-action. I conceive, therefore, that every approximation to such a condition as this exposes the fœtus to great hazard, and however true it may be, that women do give birth to their children, being reduced to a state of insensibility under the influence of chloroform or ether, and yet the child may be not still-born, there is great risk that it will be still-born; nor can statistics change the truth of the philosophical principle, which is not less true than the principle of gravitation, or the most fundamental dogma in mathematics. The inference which I should draw from

these statements is, that in the use of chloroform or ether in labors, the practitioner should have constant reference to the influence which the etherization and chloroformization might possibly exert upon the child's circulation, because the child in labor is always more or less exposed to death from asphyxia, and more particularly in cases where an early crevasse of the ovum may have taken place. Nor can I readily understand the force of motives, that in a rapid and natural labor, should induce the physician to plunge the intellectual, co-ordinating and visual lobes into total oblivion with the mere intent to subduct a natural sensation of healthful pain; nor, much more, can I conceive how in a long, tedious, and painful labor, naturally dangerous to the child, he should venture to alter the blood of the mother—yea, for seventy hours as I have heard it has been done—and yet preserve that solemn respect for the rights of the infant committed to his care, which cannot but be, under such a treatment, greatly compromised.

The fœtus in utero is liable to be born in a state of non-viability from imperfection in its development, and possibly from imperfections of its innervative operations; or it may be still-born in consequence of a premature completion of development of certain parts. Its premature development, as affecting the anatomical characters of its heart, would be necessarily fatal, while an imperfect state as to the progress of the transitive septum and arterious duct, offers equal obstacles to its continued existence. In like manner a certain degree of atelectasis pulmonum would present an insuperable obstacle to its duration, one which must be supposed of the fœtus below the sixth month, notwithstanding the case of *Fortunio Liceti*, who was born at five and a half months and died past his seventy-ninth year.

The placenta of the child is its branchial apparatus fulfilling ad interim the function to be afterwards delegated to its respiratory apparatus. In the tadpole there is a branchial organ of aëration to supply it during its larva life, but its gills disappear, giving place to its lung as soon as it is ready to quit the watery element: the placenta serves the same transitive state of life in the child. But it not unfrequently happens that in forming its mesenteric attachment in the early stage of uterine conception, and in developing that mesenteric attachment during the subsequent stages of its uterine life, it shall do so inadequately, in-

competently, imperfectly, and it may be that the child shall, notwithstanding such inadequacy or incompetency of its branchial apparatus, continue to develop itself up to a certain stage of its gestative existence, beyond which it can by no means continue to exist. I have seen many children born, that came into the world dead and putrid, without any causes that could with surety be referred to a status of its mother's health or conduct, and upon inquiry, after the labor, into the possible causes of its death, I have found the placenta manifestly too small to carry on the placental function of a fœtus of such magnitude and volume. I have seen many other children born, who, in stature and in osseous proportion, generally had been well developed, but who came greatly atrophied into the world, evidently in consequence of inadequate magnitude of its placental mass.

These, to be sure, are cases not subject to any but an *ex post facto* cognition by the medical attendant; nevertheless, it is proper to be aware of the morbific or destructive causes, since the candid explanation of them serves to protect the profession against reproach for such events, and the parents themselves from painful misgivings as to their own bodily health and powers.

Compression of the umbilical cord by cutting off the source of supply for the plasma nutritionis, and still more powerfully by obstructing the access of oxygen to the mass of the blood, is the cause of many fatalities to infants in the womb, whether in labor or before the attack of labor. I saw a beautiful child, the only hope of its parents, who never had another, evidently destroyed by a single knot upon its cord, so tightly drawn as effectually to preclude the oxygenation of its blood through the placental circulation.

There is what is called non-viability of the child arising from causes connected with the rate of its development. For example: a child's heart might be developed so as to render it impossible to carry on the respiratory life, making it necessarily perish soon after its birth. A child born under my care, a few years since, came into the world at the full term of utero-gestation, and by a process of natural labor. It began to turn blue soon after birth; to utter low moans like the voice of a kitten; to breathe very irregularly and feebly, and evidently to die of cyanosis. The various remedies which I attempted had not the least effect in arresting the progress of its maladive condition. I observed that

I could nowhere discover in its arms or legs an arterial pulse, which surprised me very much, for its heat was all the while maintained. Being surprised at the resistance of the case to the remedies which I had so often found effective to modify, if not to cure, the cyanosis neonati, I obtained permission of its friends to examine its thorax after its death.

This child was found, upon examination, to have the heart of a reptile, which consists of a single ventricle and two auricles, so that, as in the chelonians, the blood is only partially sent to the lung, while a major part of it returns, as is observed by a distinguished naturalist, to inundate the organs without having been subjected to the pulmonary action, and after having been mixed with the small portion of blood which had been subjected to aëration. The child with the heart of a reptile, is thus a non-viable child.

A similar fatal result must ever attend the case of the child in whom the septum ventriculorum is but partially completed at the period of its birth, a case which has more than once fallen under my notice in children perishing by cyanosis. It is true, that a child born with an unclosed septum ventriculorum,—provided the aperture is not too large—may, for a certain length of time, continue to carry on the pulmonary and systemic circulation, without much admixture of the blood on the two sides of the ventricular septum, and this must be plain, if we consider that the action of the two ventricles is both synchronous and symmetrical; if the two ventricles should act asymmetrically, or in unequal times, then it would follow that the ventricle acting first, or with the greatest force, would press its fluid contents through the aperture of the ventricle acting later and with less force. But inasmuch as it is the generical law, that the two ventricles should act symmetrically and synchronously, it is found—but very rarely, however—that persons have attained a great age with an opening in the septum ventriculorum.

Here is another cause of the non-viability of the child; to wit, the premature reduction or obliteration of the area of Botalli's foramen. If the child, in consequence of an extraordinary rapidity of development, should, some days previous to its birth, too considerably reduce, or entirely obliterate the foramen ovale, it would necessarily die of cyanosis for want of oxygen, because the blood, entering its venous system by the umbilical vein, could find no

access to the systemic side of the circle, except through the pulmonary circulation, a thing not to be thought of in the unborn fœtus in utero, and which, it may be said, is not competent to carry on the circulation of the whole mass of the blood.

Billard, and other observers, have shown that the foramen ovale is open at birth, and that it is closed, in the major part of children, by the twentieth or twenty-fifth day; in a vast majority of them, much earlier than this; while in numerous samples, it is found to be patulous, although covered by its valve, to a late period in life. If the valve closes, it is as effectually shut for all the purposes of the circulation as if it were closed by the complete development of the septum auricularum, and an incalculable majority of the twenty-four millions per annum, that are born, do carry on the respiratory life without the least let or hindrance, although the foramen ovale is certainly open in all of them as late as the third day. If the foramen ovale should, in a child, remain open much longer than in the average of cases, such a child might be deemed more obnoxious to the attack of cyanosis neonatorum; still a preternaturally large aperture ought not to be deemed necessarily to involve the existence of symptoms of cyanosis, since the same synergic and synchronous law applies to the auricles as applies to the ventricles; but if the innervation of the heart be asymmetrical in time or in force, then a greater energy of the right auricle could not fail to lift Botalli's valve, and while it would pour a part of its blood through the iter ad ventriculum dextrum, it could not fail to pour a large portion into the left auricle by lifting the valve, and, according to the intensity of the flow, fill the arterial side of the circle with venous blood.

The child born at the fifth month or the sixth month of utero-gestation is non-viable, partly because its pulmonary vesicles, and, indeed, its whole pulmonary structure, is at that period incompetent to the performance of its oxygenating function, and perhaps of its circulatory function. Mr. Hasse, in his Pathology, p. 241, says that atelectasis of the lung "consists in the imperfect expansion of the lung by the first inspirations after birth, that is, in a permanence of the fœtal state, in the lung of the new-born infant." It is clear that such a condition of the lung implies the non-viability of the child, and it is equally clear that there are periods of the embryonal and fœtal life, in which atelectasis is inseparable from such gestative stage of its existence.

I have seen embryos of five months carrying on a sort of respiration for some time after their expulsion, but it is probable that only a small portion, if any, of the pulmonary vesicles could escape from the atelectasic condition natural to such an early date. Even were the pulmonary vesicles to prove dilatable at such a stage, it could not be supposed that the child should be viable, on account of the strong embryonal characters of the heart, which is certainly non-viable, because of the incompleteness of its septum auricularum, which in the earlier stages of embryonal life does not exist at all. Indeed, in the earliest stages of embryonal existence, the heart is a straight cylindrical tube, whose septa begin afterwards to be formed, and are not completed until the other developments are somewhat advanced: the septum ventriculorum is always completed before the seventh month, whereas the septum auricularum is not complete until after birth—neonati always exhibiting, upon dissection, the remaining aperture of the foramen ovale.

Imperfect developments in various parts of the child are sometimes observed. A child born with an ectopy of the heart, or lung, or liver, may be pronounced non-viable. A few years since I was called to see an infant at the village of Manayunk, in which I found nearly the whole of the intestinal canal contained within a great expansion of the abdominal extremity of the umbilical cord. As the umbilical cord is a caducous substance which must be separated from the living tissues in the course of from three to ten days, it is clear that such an immense examphalos could not be returned within the belly of the child not developed to receive it, and that it would be non-viable from such an ectopy.

In January, 1848, I supervised the birth of a child, in which the whole liver was contained within the abdominal extremity of the umbilical cord, covered solely by a thickened portion of peritoneum, and having an abdomen not sufficiently capacious to retain the liver within it, had it been possible to have returned it, which it was not, since the peritoneum was indissolubly united to the substance of the umbilical cord.

Dr. Graetzer, in his work on the Diseases of the Fœtus, p. 152, attributes fœtal omphalocele to tractions made upon the navel by a cord rendered short by circumvolutions on the child's neck, or the slower and steadier tractions of a short cord. He appears to think that such efforts may give rise to a hernial sac within the abdominal extremity of the navel string. I cannot agree with the

learned author upon this point. He quotes Oken's Preisschrift über Entstehung and Heilung des Nabelbrücke to show that a fœtal omphalocele may depend upon a fault of the development of the umbilical portion of the abdominal walls.

In the earliest periods of embryonal life, the umbilical vesicle, or vitelline sac, is connected, not only by its omphalo-vitelline duct, but also by the omphalo-mesenteric artery and vein, with the intestinal tube, a knuckle of which is always, at that time, drawn up into the navel string, quite beyond and outside of the level of the belly. If any accidental adhesion, or any shortening of the vessels should detain the knuckle in the cord, it would necessarily constitute a case of omphalocele, and that would be to a considerable extent an irreducible hernia. Portions of contained intestine might perhaps be reduced within the belly, but not the whole contents of the omphalic sac. Hence there is little hope of saving the child's life, since at the fall of the cord, the intestine will be covered only with a portion of peritoneum. In all such cases, great care should be taken to cut the cord, and apply the ligature sufficiently far from the tumor, lest the gut itself should be opened; a case of which was recently related to Prof. Dunglison.

Non-viability necessarily attends all the cases of acephalous and anencephalous fœtus, and, as a general rule, it would be safe to pronounce that child non-viable, in which any degree of spina bifida should exist at the period of its birth. This statement is probably true, notwithstanding it is asserted that numerous children have been preserved, although born with spina bifida; it is as true as the statement that a six months' fœtus is non-viable, while it is admitted that children have lived, that were born at the commencement of the sixth month.

The astomatous fœtus, the fœtus that has been born with imperfection of the anus, where the failure of the development affects a considerable part of the intestinum rectum, is non-viable; as are those in whom the pulmonary artery springs from the left ventricle, while an aorta arises from the right. Persistence of the embryonal proportions of the ductus arteriosus will be fatal.

Children in the womb are liable to various disorders that destroy them before birth. They are subject to encephalic maladies, and it is not a very rare event to meet with a hydrocephalic fœtus whose head is so large as to render its transmission through

the pelvis impossible, until the part has been diminished in size, by drawing off the water of a great hydrencephalic deposit.

Children in utero are subject to retention of urine, and to dropsical collections, rendering the belly too large to be delivered, until it shall have been tapped by the surgeon-accoucheur. These immense collections in the belly have been found in some instances to depend upon retentio urinæ, revealed upon examination of the dead body of the fœtus, in which an enormous bladder had filled up and distended the abdomen so completely, that it was impossible for the child to be born until paracentesis had been effected.

Children, doubtless, are still-born from apoplexy; they perish from hypertrophy, from atrophy, from various sanguine congestions and engorgements, interfering with the growth and development of their organs. Many children are destroyed in the womb by the detachment, accidental or spontaneous, of the placenta, cutting off, entirely or partially, the sources both of the plasma nutritionis, and of the oxygenating material. Children, also, are lost from forming knots on the cord, which being drawn tight, obstruct the umbilical circulation.

They are destroyed by the muscular action of the uterus. A primiparous woman, whose waters give way before the commencement of labor, and who, after a long and tedious labor, gives birth to her child, is more likely than not to find it still-born; for, the child, under these circumstances, being subjected to the unmitigated pressure of the womb, without the intervening protection of the waters, must have its placenta so frequently, and for so long a time, compressed between the uterine paries and its body, as to suffer death from the suspension of the oxygenating process of its placental organ.

There are many uteri to be met with, that refuse to yield to the distending force of the growing ovum, either on account of excessive muscular irritability of the fundus and body of the organ, or from a non-conformable weakness and relaxation of the cervical and orificial portion of the uterine sac. Excessive development of the power of the fundus might well, in many women, result in the premature expulsion of the ovum; and, too feeble an innervation of the retentive fibres of the organ, which are found at the cervix, would be sufficient to bring on the premature expulsion of the embryo, or the fœtus, under a true healthful irritation of the expulsive portions of the womb.

As soon as the act of expulsion of the head is complete, the medical attendant knows that the child which is about to come into the world, is living, by a certain feel of rigidity, or stiffness of the neck, though there is no absolute motion; and he fears that it is dead, or in asphyxia, or in lypothymia, whenever an utter relaxation of the muscles of the neck permits the head to fall without any semblance of textural tension. In case a child's head is born under circumstances of a total absence of such textural tension of the neck, the attendant should make haste to free its body from its imprisonment within the organs, for the thorax still remaining compressed by the vagina and other parts that constringe it, there is little prospect that the first act of respiration will be performed, until the elastic force of the cartilages and bony thorax shall be set free from the influence of such pressure, and, by dilating the capacity of the thorax, fill the lungs with air, which, influencing the blood in the pulmonary capillaries, may serve to awaken the biotic force, by sending oxygen to the brain. It is true that the child, in many instances, makes its first aspiration before the delivery of the thorax, but it is not less true, that when the head is born, the pressure upon the thorax, or upon the trunk, is always partially relieved, and the elasticity of the trunk permits the air to enter the pulmonary vesicles, even before the diaphragm makes its first contraction.

In most labors, the contraction of the uterus that serves to expel the pelvic extremity of the child from the cavity of the organ, condenses the placental superficies of the uterine surface sufficiently to displace a part, and often the whole, of the placenta; and in all such cases that superficies is so greatly reduced in area, as effectually to preclude all idea of any valid performance of the placental function. Hence, it happens that, in all the cases where the head is the part last born, the child incurs considerable hazard from asphyxia; for, the branchial office being suspended, and the mouth and nostrils as yet unexposed to the atmospheric air, any considerable delay in the delivery of the mouth and nostrils must coincide with the total suspension of the process of aërating the blood.

The child may be apoplectic at its birth: it is apoplectic from injury done to it by the resistance of the bony parts of the pelvis, against which it has been impelled, and by pressure of instruments employed for its delivery, particularly where such instruments are

inaptly adjusted to the surfaces of the child's cranium. Indentations of the bones and fractures of them are not rare accidents; accidents likely to be attended with extravasation or effusion.

The medulla oblongata, or at least the spinal cord lodged in the three uppermost cervical vertebræ, must be, in some cases of extreme extension of the head in face presentations, dangerously compromised, or even destroyed. Slight shocks, or torsions, or compressions of this part of the nervous system, are likely to contravene the power of the child to carry on the respiratory function. An apoplectic condition is threatened in all cases of the living fœtus, in which the head being already born, some deviation, some want of rotation, or some excessive proportion of the upper part of the trunk and shoulders, require long protracted efforts of the womb to expel the trunk into the world. In these cases of delay, the whole head of the child appears suffused with a dark purple circulation, becoming more and more intense in hue, in proportion to the length of the delay. But, it is reasonable to suppose, *à priori*, that this would be the case, since the head being entirely free from pressure, while the trunk and members remain under a pressure of many pounds, equal to the pressure of many atmospheres, great masses of the circulation should be driven qua data porta, that is to say, into the vessels of the freed head, whence it can with difficulty return into the trunk and members, compressed as they are by the vagina and other non-muscular tissues. Such an apoplexy, for the most part, is venous, and depends, probably, on a distension of the sinuses and venous apparatus of the brain, a condition, which, when excessive, implies always a tendency to rupture of vessels and extravasation.

The child is often born in a state of lypothymia, or fainting; the body of the infant is here perfectly relaxed; the surface is very pale; no muscular tension is observable in any part of the trunk, neck, or members; the diaphragm fails to move, and there are no signs of innervation, except the feeble beatings of the heart, perceptible at the umbilical cord, and by auscultation of the thorax.

It is easy to distinguish between the apoplectic, the asphyxiated, and the syncopal condition of the child, and the treatment for each should be well considered. In the asphyxiated state of the child, artificial insufflation of the lung, and the frequent sudden dash of cold fluids upon the face and breast, and stimulating and exciting slaps upon the buttock and thighs, may properly and

hopefully be had recourse to. In the apoplectical condition, an immediate section of the cord should be made, from the cut abdominal extremity of which the blood should be received into a tablespoon, until the sufficient abstraction of blood shall have served to relieve the engorged vessels of the encephalon. Such a process is unnecessary and improper in the asphyxiated condition, in which a general livid hue of the child, accompanied with asphyxial relaxation of all muscular tension, and very faint and intermittent pulsation in the umbilical cord, serve as means of diagnostication. In the pallid, syncopal state of the new-born infant, gentle frictions, puffs of air into the face, the smoke of a burnt feather, volatiles held to the nose, and perfect rest in an absolutely horizontal position, are to be recommended. It would be as unreasonable in this form of syncope, to take a child into the lap, and hold it in the erect posture as it would be to lift a fainting patient from the floor, and stand him on his feet, for there is this great difference between asphyxia and syncope, namely, that in asphyxia the vessels of the brain are well filled with blood, and the tension of the cerebral mass is not different, perhaps, from that of the highest health, whereas in lypothymia, the tension of the cerebral mass is always below the par of health. In asphyxia, the vessels of the brain are occupied and distended with carboniferous blood, whereas in syncope, the vessels contain too small a proportion of blood of any kind. Blood loaded with carbon can by no means evolve in the brain the biotic force; too small a quantity of blood in the brain is, in like manner, incapable of effecting that evolution. In the treatment of asphyxia, the object of the accoucheur should be to redden the blood, by promoting the act of respiration; in the treatment of lypothymia his intention should be to direct a greater quantity of blood upon the brain, which he will scarcely effect, if he take the child from a recumbency, or low horizontality, into a vertical or highly inclined posture.

I have already said that, in most labors, the placenta becomes detached either before or during the last contractions of the womb that effect the expulsion of the fœtus from its capacity. In all cases of head presentation, this is to be deemed a fortunate event for the mother, for whom an early separation and extrusion of the secundines, are both a sign and a warrant of her safety; though it is indifferent as to the interests of the child.

Those labors in which the presentation implies that the head is to be the part latest to leave the capacity of the womb, are hazardous for the neonatus on this very account; because, if, when the head is lodged in the vagina, outside of the circle of the os uteri, any delay in the completion of the birth should take place, the child incurs a risk, proportioned to such delay, of perishing with asphyxia; since it can receive no oxygen from the uterine surface of a detached placenta;—and since, indeed, the crushing and compressing effect of the uterine contractions on the branchial mass must as effectually, as even the complete detachment of it, preclude all processes of oxygenation through it.

I make mention of this here, in order to justify my precept as to the management of such cases; a precept that I have not failed to inculcate in my lectures for several years past. The precept is this—*videlicet*, in all cases where the head is the last to be expelled, the accoucheur ought to provide himself with a light and convenient obstetric forceps with which to extricate the head from its dangerous detention in case of delay.

It has been supposed that one child in seven has perished from the pelvic presentation, and though M. Paul Dubois avers, (*vide* Cazeaux, p. 359,) that only one in eleven pelvic, whereas only one in fifty cephalic presentations is lost, if we take into the account *all* the cases where the head is last born, we shall discover a much greater proportion of fatalities.

It is now many years since, that, induced by the loss of a child in pelvic labor, which I could have readily saved by the forceps, I resolved never to omit having the instrument at hand in such cases; and I am very fully convinced that the loss of children in all labors in which the head is latest to be expelled, is not in my hands greater than one in eighteen, or one in twenty; and I fully believe that the mere precaution of providing for the exigency by having the forceps *at hand*, will enable any accoucheur of moderate skill greatly to lessen the distressing proportions of fatalities in his practice.

Doubtless, in many such labors, the child is lost by too anxious a desire to hasten its deliverance, prompting the attendant to excessive traction by the neck. An accoucheur will trust himself to pull with a degree of violence that would fill him with horror, should any equal force be applied to an infant lying in the nurse's arms and dressed. A tractile force equal to eight pounds, ap-

pears to me to be a very dangerous one, and I think it must be evidently dangerous, if we reflect upon this, namely, that to lift up a child by two hands, placed, one on each side of the head, to "see London," as it is called, is a dangerous amusement; but, a child of eight pounds held up in this way, will have a tractile force not exceeding some five and a half to six pounds exerted on its neck, by the weight of the body and limbs. To pull at the neck of an undelivered fœtus in the pelvic presentation, with a force equal to six or seven pounds, therefore, would be to go as far as prudence allows. With the light forceps of Prof. Davis, which is easily adjusted to the head, in the pelvic presentations, one may readily employ a much greater force without fear or hesitation. Hence, I venture to recommend that precautions against the dangers arising from separation or compression of the placenta in such cases, be invariably taken by preparing, and having at hand the forceps, which it might be too late to procure by a five minutes' walk.

Having thus expressed my opinion as to the precautions required in all pelvic presentations, and others, in which the child is last to be born, I proceed to say that when the child, after its expulsion, lies still without breathing, but with a pulsating cord, it is to be held that the respiratory innervation has failed, and that the fault resides in some obstruction or failure as to the medulla oblongata, which is the respiratory portion of the brain, and not elsewhere. I repeat that, in such cases, we are to look to the state of the medulla oblongata, and considering that as the suffering point, direct all our resources towards the re-installation of its powers, seeing that if it be re-established in its full force, it alone is capable of recalling the other portions of the nervous mass to their healthful condition, and so as to all the dependencies of the nervous mass.

Whatever may serve to produce sensitive activity in the medulla oblongata, is calculated to excite the motor cords that take their rise from it. Its sensitive cords are often quick with life, while its motor fibrils are inapt and dull as to their duty. To impress any one of the departments that are under the direct control of the system of innervations, is to arouse the motor force for all of them. Then, as the nerves of physiognomical expression, have the same origin as those of the respiration, to awaken the motor power of one, is to set on foot that of the other. Hence,

to stoop and puff the breath very suddenly, upon the face of the child, to sprinkle it with brandy, or with water, to irritate its nostril, to pour from a height, a stream of cold spirit upon its breast, to slap its buttock with the hand, to irritate the muscular diaphragm by frictions with the open palm, is, in numberless instances, to awaken the movement force, and establish it, which, without such measures, would probably pass into a deeper and fatal anæsthesia of this *vital* tie, this *nœud-vital*, to use M. Flouren's beautiful *mot*.

In cases where these external measures fail, the declining temperature must be maintained by the warm bath, which may be rendered stimulating by the addition of brandy; which allows time for the further application of such agents, as may serve to rouse into activity the torpid sources of the pneumogastric nerves. It is worthy of remark, that the late Dr. Dewees was from much experience of cases, more inclined to the employment of dry heat and frictions, than that of the bath. I have the greatest respect for the practical precepts of that distinguished physician, but I cannot on that account hesitate to remark that the use of the bath is far more convenient than that of dry frictions, since the form and smallness of a new-born child, make it very difficult and awkward to employ frictions; whereas the bath, rendered exciting by spirit, or wine, or mustard, is quite free from any objection of its inconveniency. A light electro-galvanic battery, if at hand, might be profitably employed to institute the first contractions of the diaphragm, that are alone required to charge the blood of the pulmonary capillaries with oxygen, which, once in the brain, immediately sets free the hitherto torpid biotic powers of the medulla oblongata. I have no clinical experience of my own to cite in favor of such a recourse, because, when I have made use of the battery for this end, so great delay has occurred in the preparation of it, that life was wholly extinct before it could be brought to act upon the infant. Sutton's light and convenient apparatus could be readily, in all suspected cases, be placed in proper activity in an adjoining apartment; and, doubtless, such a good precaution would be followed by some degree of success, otherwise unattainable. Sutton's battery is contained in a small box, and can be very easily transported to any point at which it might be deemed likely to be wanted. Shocks from such a battery passing from the vertex to the umbilicus, or transversely

through the lower margin of the thorax, might set the machinery of the respiration in motion, and thus move the entire train of the innervative forces.

The remainder of the umbilical cord of the child is cast off, being separated from the living surfaces by a process of absorption, or of sloughings which are virtually absorptions. The cord dies,—it becomes perfectly dry, and of a crisp or corneous hardness.

As the cord contains two umbilical arteries, and an umbilical vein, surrounded by a magma of tissue enclosing a fluid, which is called the Whartonian jelly, it follows that the liquid part of this jelly must escape from the cord by a process of exosmose, and in proportion to the mass of the cord, will, perhaps, be the time required for the complete separation of the fluid contents of the umbilicus, and its exsiccation. There are some specimens of the umbilical cord which are not much larger than a swan quill, while others are as big as one's thumb; it might naturally be expected that a heavy, large stout cord might require a longer time to effect its separation, than a small, delicate one, since the perfect exsiccation of a large portion of it must be effected before the fall. There are many specimens of cords that are found to be entirely detached before the end of the third day, whereas some retain their connection with the living surfaces as late as the tenth or even the twelfth day; for the most part, I think that the cord falls somewhere between the fifth and the seventh day.

It is two arteries and one vein that must be detached in this case, and doubtless there will be met with considerable variety in the strength and vigor of these vessels; very powerful and vigorous umbilical arteries will probably have much stouter and heavier elastic coats, than smaller and more delicate ones, and longer time will be required for their detachment.

A ligature put upon the umbilical cord, before the severing of the child, does not always put an immediate stop to the pulsation in the abdominal extremity of the vessels, and in some instances the effect of the heart's systole is felt up to the ligature for a long time after the cord's severance: for the most part, however, the pulsation soon ceases, and the elastic coat of the vessels reduces the calibre to its minimum diameter. Sometimes a small portion of coagulated blood is found in the dried tubes, after the fall of the cord, when all vitality as to the vasa vasorum of the vessels

being at an end, the living absorbents cut them off at the level of the umbilicus, which in fœtuses is always protuberant, always projecting beyond the general level of the belly. The process of separation may be observed to begin upon the circumference of the umbilicus, where the amniotic coat of the cord comes in contact with the dermal surface, and a raw superficies is visible at the point at which the detachment takes place.

An artery cut off by a knife, is invariably retracted in consequence of the elasticity of its coats; and the retraction of the umbilical vessels within the belly has the effect of drawing the navel inwards, and converting it into a dimple, instead of leaving it protuberant as it was before the birth of the child and the fall of the cord; if the contraction is very powerful, the dimple of the navel becomes very deep, and the deepest part of the navel is that which looks downwards towards the bladder. There is also a degree, but a less degree of contraction in the remainder of the umbilical vein, which passes along the falciform ligament of the liver to enter the portal vein, and hence we see a kind of cushion in the upper half of the dimple of the navel.

This retraction of the umbilicus is an economical process, by means of which the raw and exposed surface left by the detachment of the cord is greatly diminished in its superficies, and therefore requires a much shorter process of healing. Indeed, in some specimens, it appears to be healed almost as soon as the cord falls. It sometimes happens that the retraction of the artery and vein being imperfect and incomplete, the child is found to have a protuberant navel, which excites suspicion on the part of the mother, that all is not well; and indeed, all is not well, for, inasmuch as the retraction of the surfaces has not taken place, the umbilical ring remains imperfectly closed, and there is a constant tendency on the part of the omentum or of a knuckle of intestine to engage in the dilated ring, thus furnishing a physical obstruction to its perfect contraction or closure, and thereby exposing the child, in the morning of its life, to the attack of a troublesome and dangerous examphalos.

It is plain, if this statement be correct, and I doubt not that it is correct, since it is the explanation of Billard, that admirable Frenchman, whose early loss was deplored by every friend of science,—it is clear that the attentive physician ought to take all necessary precautions to promote the retraction of the um-

bilical arteries and vein; he should not prevent the monthly nurse from using a proper compress, of sufficient strength and thickness, to oppose the action of those causes, that would tend to drive the umbilicus outwards, nor ought he, from some erroneous notion of the uses of the bandage, to direct the swathing of the child to be discontinued before the end of the month. If, at the end of that time, the umbilicus be found to be very deep and very perfect, there is probably no further necessity for the employment of the belly band; but, the use of the band should not be dispensed with, in any case, as long as any protrusion or disposition to protrusion is found to remain.

The cord is generally cut off even with the dermal level, which, as I have already said, is then retracted to make the umbilical dimple. Occasionally, however, and not very unfrequently, it separates further off than the dermal level, leaving a button-like remainder, a sort of bunch of granulations as big as the head of a diaper pin, sometimes as big as a small pea, and very rarely not less than half an inch long, and which can never heal; for it is incapable of healing, as it can form no dermoid nor epithelial surface. I have seen one unhealed at the twenty-second year of a young man's age. This accident depends, probably, upon this, namely, that the vasa vasorum of one or both of the umbilical arteries do not perish quite down to the dermal level; and being cut off by the absorbent vessels at too great a distance from the surface, they cannot clothe themselves with a true scarf skin, and therefore cannot heal. This discovery is not often made until the end of the month, or until the fifth or sixth week of the life of the child, when it excites a natural alarm in the tender bosom of the parent, who never fails to attribute it to the fault of the doctor in tying the cord, or to the carelessness of the nurse in dressing it, whereas the fault is to be laid at the door of the vasa vasorum, whose pertinacious vitality has compelled the absorbents to cut them off too far outside.

This little tubercle of granulations grows from a very narrow peduncle or footstalk, and doubtless it might be twisted off with a pair of dressing forceps without the slightest injury; but one does not like to do violence to a young baby, and one is liable to reflect that the canal of the arteries might remain patulous at that late period of life. Let it be surrounded with a waxed silk thread,

tied tightly, and it will probably fall off on the succeeding day; after which it gives no further trouble.

In some children, the surfaces from which the umbilical cord is detached, are affected with ulcerative inflammation; when, a hard, swollen, red base being fully formed, the ulcerative process is likely to continue until the basis on which it sits is cured of its inflammation. It is as unreasonable to expect to heal such an ulcer until the base has first begun to recover, as it would be to heal an open cancer seated upon a carcinomatous base before that carcinomatous base is removed. Now and then it happens that the inflamed areola becomes a vast area, spreading over almost the whole abdomen of the child, invading at least, the whole of its umbilical region, under which circumstances the most violent erysipelas seizes upon the tissues and extends down to the genital organs, or rambles over other parts of the child, until it perishes miserably, from a copious, sanious and bloody discharge constantly flowing from the surfaces of ulceration. The new born child, in whom inflammation seizes upon the circumference of its umbilicus, is in danger, and should receive the careful attention of the physician. This occurrence, being out of the common order of events in the lying-in chamber, is apt to be misconstrued, and places the medical man in a false position of unjust imputation or innuendo; let him therefore be careful to make an explanation of the circumstances, so as to defend, not only himself, but his class, from unjust accusations. Probably the best mode of treatment in such cases, is to cover the inflamed part with pledgets of lint dipped in cold infusion of flaxseed or slippery elm, after taking the precaution to circumscribe the augmenting area of inflammation by producing a new and different irritation, in drawing around it the point of the nitrate pencil. The inflammation produced by the point of a nitrate of silver pencil drawn around and outside the circle of inflammation, preoccupies the tissue involved, preventing, by its occupation or prepossession, the extension of the primal malady beyond the limits thus assigned and circumscribed. A leech or two, placed upon the white tissue, and never upon the red tissue, might favorably incline the diseased parts to recover through the process of resolution of inflammation, but if they cannot recover by resolution, and can be prevented from spreading over the whole umbilical region by the method of circumscription already mentioned, then there may be time to wait until the process of ulcerative suppura-

tion shall disengorge the inflamed tissues, so that when the inflamed base is healed, the ulcer may be cicatrized. I have seen several deaths from this cause; and my friend Dr. Rutter, of the district of Southwark, has observed many children to perish from erysipelatous inflammation commencing at the umbilicus, in the disastrous epidemic of puerperal peritonitis, which he witnessed in that district.

The new born child generally comes into the world with its large intestine loaded with a dark, viscous, adhesive substance, called meconium, which may be found in the intestines very early. I have found it as early as the fifth month of fœtal life; it is probably the stercoraceous product of a gastro-intestinal digestion of mucous, of muco-albuminous and bilious deposits in the alimentary tube of the embryo or fœtus. The quantity is sometimes very great, and the intestine so loaded with it, that when the child is born, the peristaltic power not being called into action, the infant seems to suffer irritation from its presence. It is thought, and it is very probable, that when the quantity is very great, and the substance extremely viscid and adhesive in its consistence, the child shall feel pain, which is called griping, from irregular and spasmodic attempts of the peristaltic muscles to move it off the mucous surface. It is, most evidently, quite reasonable to give some artificial aid to the bowels by the injection of water or mucilage, pure, or rendered more exciting by the addition of small quantities of salt, or oil, or molasses, or a mixture of all three; or chamomile tea, with a little castor oil, may be used as the enema. For the most part, in this country, a child in whom the meconium does not come off, is compelled to swallow castor oil, of which the quantity usually given is a small teaspoonful, which is more than is required for the occasion. Half a teaspoonful of fresh castor oil, which is not rancid, should be thrown into a tea-cup containing some warm sweetened water, from which the globules should be skimmed off with a spoon, and given to the child until the whole quantity is taken.

Where a child passes a whole day without having its first evacuation, it becomes the duty of the physician to inquire into the state of the rectum, in order to know whether it be subject to some imperforation or congenital narrowness of the bowel or not. In the case of imperforation, if the absence of the bowel is not too complete, and if the upper segment of the intestine be

found a short distance of the anus, it is possible, and it has sometimes been practised, to make a communication with the interior of the gut by a bistoury or trocar, but these operations mostly fail in the long run. Yet some have proved successful.

In one case, that of a child, otherwise very perfect in its formation, it was observed that no alvine dejections took place for the first two or three days after birth, the infant in the meantime taking food freely. When it at length became affected with pain, I made an examination, and found the rectum so much contracted, that I could only introduce one of the smallest sized bougies, that are made of rolled linen, and that only after the most persevering attempts. I think that the intestine, for two or three inches, was not larger than the urethra of the child. I succeeded, after the most patient efforts, in conducting the point of the bougie into the more expanded portions of the gut, and upon withdrawing it, perceived that it was followed by a small discharge of meconium. I carefully dilated the intestine with larger and larger cereoles, until the child being restored to health, I had no more occasion to see it. It afterwards died at an early age, of disease of the brain.

It struck me, while attending this patient, that some of the cases of supposed imperforation, are only cases of congenital narrowness, and that a more careful examination might reveal to the surgeon the existence of a canal, which, without great care, might escape his observation, and I would recommend that in all cases of suspected imperfection, this point should be settled before making any incision, or perforation with the trocar. In any such cases, it would be much preferable that the child should be cured by the dilatation of a natural passage, which, after the cure, leaves a natural surface, rather than it should be healed by incision with a bistoury or trocar, which could leave nothing but a cicatrized surface, and which, being unnatural, is always liable to disease.

CHAPTER II.

CAPUT SUCCEDANEUM.

It happens, not unfrequently, that the child comes into the world with a swelling, and sometimes with two swellings, upon the head, which has received the appellation of caput succedaneum, or substitute head. In most of these cases, the swelling is found upon the vertex; and, indeed, in primiparous labors, where there has been an early rupture of the ovum followed by a reluctant dilatation of the os uteri, it will be found generally, that considerable effusion and engorgement in the scalp covering the vertex, are present: this swelling usually disappears, I think, within some twelve hours after the delivery; but, occasionally, the effusion continues to take place until a very considerable, elevated, fluctuating tumor becomes completely formed.

I have never seen an infant born with this fluctuating tumor, though I have met with a great number of them in which the fluctuating swelling has been discovered by the end of the first day. This constitutes caput succedaneum.

Prof. Froriep, in his *Handbuch der Geburtshülfe*, sec. 328, tells us that this tumor, which the Germans call blutbeulen and kopfblutgeschwulst, appears in from twenty-four to forty-eight hours after the termination of the labor.

I have met with several samples of the affection in which a caput succedaneum occupied each of the parietal regions, making two distinct fluctuating tumors, one on the right and the other upon the left parietal protuberance, and having no connection with each other.

Froriep remarks, very correctly, that the swelling is neither hot, nor painful, nor red. It appears to consist of a watery blood that does not coagulate, and that is removed by the absorbents without evincing any tendency to suppuration. It is a mere ecchymoma or ecchymosis from pressure. There is this very singular circumstance, that it manifests itself so long after the accidental cause of it; which may be explained, perhaps, by sup-

posing that a bloody serum continuing to ooze into the seat of the ecchymoma, comes at last to form a soft fluctuating lump as large or larger than half an egg. The margin of this tumor feels as if the cranium were wanting, so sharp and precipitous is the limitary edge of the circumscribed cavity, containing the blood. Ecchymoma capitis may be correctly defined as a circumscribed cavity containing bloody serum; in which it differs from abscess, which is a circumscribed cavity containing pus.

Among the numerous examples that have fallen under my notice in thirty years, two only have ended in suppuration. One of these was of enormous size, covering the entire crown—it was discharged by the point of a lancet—but the operation was deferred so long, that the child afterwards sunk under the excessive and protracted irritation. The other child recovered.

I believe that the rule should be, to refrain from opening the cavity, and rather, to wait for the absorption of the fluid, which being done, the scalp is observed to have recovered its healthy elasticity and tone.

Perhaps no therapeutical treatment is really requisite; but as I have for so many years, and in such very numerous instances, been accustomed to follow a routine of treatment, I do not feel justified, after a long success, in laying it aside.

My custom is to cover the swelling with a cataplasm that is worn under the cap, which holds it well in place.

The cataplasm is composed of a very thin or diffluent poultice of crumbs of bread boiled in milk—to be afterwards thickened with the petals of chamomile—stirred in while the poultice is hot, and in quantity enough to give it a proper pultaceous consistence.

The poultice is usually worn by my patient until the absorption is completed.

I have, among others, the following motive for using the chamomile poultice; namely, the child does not suffer from any eczematous tendency, that generally manifests itself under the simple bread poultice, when long worn.

I believe that a caput succedaneum, not excessively large, will generally disappear in the third week.

I suppose that to puncture and evacuate the cavity, might lead to an earlier and less troublesome cure—but it is also to be presumed that the puncture exposes the scalp to a risk of erysipelatous or suppurative inflammation—I, therefore, respectfully advise the

safer plan of trusting the cure to the absorbents; the more confidently, inasmuch as, in the majority of my cases, I have found every vestige of the accident to disappear by the twenty-first day, while only a few have lingered as long as the thirtieth day.

CHAPTER III.

INFLAMMATION OF THE EYES.

It is very common to observe in the neonate, one or both eyes to become inflamed within twenty-four hours after the delivery. In a multitude of such cases, the trouble arises merely from a slight inflammatory engorgement of the conjunctive coat of the lid, which sometimes, however, extends to the orifices, and perhaps to the excretory ducts, of the Meibomian glands. The simple and slighter forms of the malady are usually treated, and found readily curable, by frequent bathings with warm milk and water, and pretty generally by spirting the mother's milk, from the nipple itself, into the eyes. Such bathings, for which, in this quarter, an ordinary and good substitute is found in the mucilage of sassafras-pith, suffice for a major part of the cases.

Those examples, however, that do not readily yield to so domestic a medication, require the attention of the physician, who, upon separating the lids, is often surprised to discover a jet of pus to issue from between them. To discover such a jet of pus is to become aware of very considerable alteration in the histological state of the conjunctiva, which, by force of inflammation, has now become converted from a mucogenic to a pyogenic membrane or tissue, a condition that is likely to extend itself by invading all the congenerous textures. It is, therefore, important to secure an early recovery.

If the lower lid be pulled downwards, and very slightly everted, so as to enable the observer to see the state of the palpebral conjunctiva with a lens, it will be found to have become finely granular; or in, other words, to have lost a part or the major part of its epithelial covering, whence arises its faculty of excreting

pus instead of mucus, which alone it would produce while in a natural and healthy condition.

The secretion from the granular surface is, in some of the examples, very abundant; so much so, that repeatedly during each day, there collects beneath the closed palpebræ a quantity of pus, sufficient to constitute a fluctuating tumor which is a true abscess—for it is a "circumscribed cavity containing pus," the cavity consisting of the whole conjunctiva, closed by the firm apposition of the upper and lower palpebræ.—When the surgeon opens the eye, the cavity is opened and emptied, but immediately commences to fill again by the firm closure of the tarsal edges.

All persons, nearly, who have conjunctivitis, even very slight attacks, have a coincident intolerance of light; and the young infant, like older patients, appears to suffer distress when too much light is admitted into the room. Hence, among other items of treatment, an important one consists in a correct gauge of light for the patient. It does not seem to me that black darkness is requisite, but that a dim and obscure chamber should be chosen.

It is clear, from this representation, that, in addition to the care as to the intenseness of the light admitted, one should observe constant precautions as to the virtual conjunctival abscess, which ought to be opened and discharged many times a day by separating the lids. This precept is certainly worth attention, for it is extremely common to find that the pus is not discharged from the conjunctival sac, for many consecutive hours, by the nurses or managers of the little patient: and it is quite certain, that, to allow the whole front of the globe with its transparent cornea to swim in a thick purulent lotion for hours together, is to invite the extension of the granulating process to the corneal conjunctiva itself.

To cleanse the eye, nothing is so convenient or well adapted as a bit of fine sponge, which picks up the fluids, while a piece of rag slides over them. The sponge ought to be applied many times a day, and that, with a gentle pressure, sufficiently firm, however, to press out the fluids from between the margins of the lids.

In very young infants, the inflammation extends, in some of them, through the substance of the palpebræ to the corpus mucosum of the lid, which is thus inflamed through and through, and becomes greatly thickened; indeed, so much thickened as to make it quite impossible to obtain a view of the cornea.

Under these circumstances, a very good dressing is had by keeping the lids covered with pledgets dipped in cold water, or cool flaxseed, sassafras, or slippery-elm mucilage, carefully strained.

As a collyrium, I beg leave to recommend the following formula for one that I have been accustomed to prescribe for many years. Take of acetate of zinc, two grains; of wine of opium, twenty drops; of rose water, one ounce; to make a collyrium. Pledgets moistened with this collyrium may be kept upon the closed lids, and occasionally, upon depressing the lower lid, the slightly exposed or everted conjunctiva and tarsal border should be touched by the sweep of a camel hair pencil, dipped in the liquid.

Where this does not very soon introduce signs of amendment, the camel hair pencil should be dipped in a solution of nitrate of silver, two to four grains to the ounce, with which the lower lid, everted, ought to be suddenly swept; an instantaneous contact only being required. As soon as the lids close, the rolling of the ball serves to make the rest of the application. This plan is equally efficacious with that of dropping the solution into the eye, and far less painful.

Leeches are sometimes required, as well as blisters, to the mastoid spaces, or to the nucha—but these are very painful remedies, that are rather to be eschewed, if possible.

I am not writing a treatise upon ophthalmology, and shall not, therefore, give any greater extension to these remarks, which relate rather to a very common specialty in the practice of the accoucheur, than to the ordinary business of the oculist and ophthalmologist. I shall merely add, that the young practitioner ought to be always watchful of the earliest opportunity to ascertain the state of the cornea in these cases of infantile conjunctivitis and psorophthalmy—in order that he might be able to take the wisest precautions against the progress of ulcerations, or intense vascular injections of the corneal conjunctiva that might end in a glaucoma, or some still more disastrous result of such inflammations.

SORE MOUTH.

When a young child is put into the hands of a monthly nurse, she is sure to expect that her nursling will have, within the

month, and generally within the first fortnight, an attack of children's sore mouth, commonly known as aphthæ.

The quite general expectation of such an occurrence, entertained by nurses and experienced women, shows that young children are very liable to the disorder in question, nor is there any great reason to be surprised, that parts so tender and delicate in their structure, should become inflamed very soon after the first application of them to the purpose of sucking. Indeed, the suction power of a young child is so strong as most frequently to produce some degree of inflammation in the mother's nipple, and, in many instances, to inflame it so severely as to cause painful ulceration. The same force that is employed to blister, to inflame or ulcerate the nipple, is equal to the development of a certain degree of inflammation of the mouth of the child; for, in employing the force, it is decomposed, one half of it being exerted on the nipple, and the other half on the mouth of the child. Hence, when we hear of a child's sore mouth, we are almost sure to hear of a mother's sore nipple, and vice versa, for they mutually hurt each other; hence, also, the general opinion that the child's sore mouth is contagious, whereas it is merely mutual as betwixt the nipple and the mouth.

There are various grades of the stomatitis of children. It may be a mere erythema of the corpus mucosum, unattended with the formation of the little pustules or bullæ, which, when they break, leave a raw surface upon the general inflamed base. This stomatitis erythematica is characterized by diffused redness and dryness of the mucous membrane of the lips, gums, tongue, cheeks, and palate, which have become the permanent seats of a sanguine affluxion determined to them by the act of sucking, which is not unlike that of the cupping glass.

In this condition, the surfaces look not only dry, but somewhat smooth and shining—and are evidently a little painful at the first attempts to draw the breast, but become less so as soon as they are fully moistened and lubricated by the inflowing milk, saliva, and mucus, with which the whole mouth is bathed as soon as the action commences.

Whenever this redness acquires a certain intensity, the inflammatory action has reached a stage in which small portions of coagulating lymph are excreted, and remain here and there attached to the membrane, presenting the appearance of whitish

specks or sloughs. If removed by wiping them off with a handkerchief, they are mostly found to leave no little ulcer beneath—yet sometimes when thus taken off, there is evidently a small pit beneath them.

These deposits of lymph are, I presume, identical in character with the lymph deposits that are seen on the throat and palate in croup and in scarlet fever, and on the whole buccal and palatine mucous surfaces in some cases of mercurial ptyalism.

Some of the spots consist of very small vesicles filled with a coagulated albumen, or perhaps with lymph—which is contained beneath an epithelial capsule or covering; and which cannot be wiped off with a handkerchief or linen rag, until after the capsule has been broken open. Now and then the capsules, and even the uncovered lymph or fibrinous deposits, are observed of an ashen hue—or they may be seen to turn of a drab or black color, owing probably to the mixture of a small portion of blood-discs that have escaped together with the other inflammatory products, and which, by their presence, indicate a very high degree of inflammatory action.

It is common among practitioners to attribute the sore mouth to a faulty condition of the primæ viæ, consisting of an acid or mucous-saburral state of those organs. There is little reason to doubt that an unhealthy state of the digestive organs may introduce an irritable condition of the mouth and fauces, and thus give rise to a greater disposition in the parts to inflame under the cupping action of the mouth in sucking—but very certainly, we meet with numerous examples of aphthous children in whom the health of the stomach and bowels continues to be perfectly good, and who, therefore, do not require any doses of physic.

The slighter cases of aphthæ are treated by cleanliness—which means, by washing the mouth carefully with a linen rag dipped in cold water, so as to remove all remnants of milk, that, by fermenting in the mouth, might add to the erythematous propensity. It is common also to rinse the mouth with borax water—or to sprinkle upon the tongue a small pinch of pulverized borax and sugar.

A teaspoonful of honey of roses, to which may be added a tablespoonful of water and a pinch of alum or borax, is a convenient and useful remedy, as is also a little weak lime-water; and especially a mixture composed of one drachm of Peruvian bark

powder, and a gill of lime-water—which often removes the disorder very speedily, if used as a wash for the mouth.

In bad cases, recourse ought to be had to the antiphlogistic powers of the argentum nitratum, of which a solution, consisting of a grain of the nitrate to one ounce of distilled water, may be very safely and usefully applied to the diseased surfaces with a throat-brush—a large camel-hair pencil.

The constitutional disorders which accompany some of the cases, require their appropriate treatment, which is various as the stages and differences of those constitutional maladies.

For example, fever, or chronic diarrhœa and dysentery, long and protracted bronchial catarrhs, each will require the course of treatment appropriate to it, in order to remove the sore mouth, which, under such circumstances, is rather an epi-phenomenon, than a primary affection. Perhaps, it may be deemed advisable in all the cases, to exhibit small aperient doses of an antacid medicine, such as magnesia, infusion of rhubarb mixed with lime water, or even, in certain instances, very small doses of hydrarg. cum cretâ. But all these doses should be held in reserve for the actually necessary demands of the patient; and they should not be given unless most clearly indicated by the wants of the case.

The kind of sore mouth called by the French writers muguet, is asserted to be a vegetable or sporiferous substance, developed upon the mucous membrane of the mouth. It is distinguishable from aphthæ by its conical form, and by its being uncovered by any capsule of epithelium. It is a collection of vegetable spores, (Sporotrychium,) which fall off in the course of four days.

CHAPTER IV.

CORYZA.

The faculties of a young child are merely instinctive, not rational, nor intelligent.

While its instinctive sense suffices for its wants, the child is well; but when circumstances call for the use of the reasoning faculties, in order to rescue it from any dangerous predicament, it is liable to perish, because it is incapable of reasoning, and can have no dependence save on its instinctive faculties and powers.

Inasmuch as the act of respiration is one of the most important of the vital functions, it follows, that whatever may serve to contravene it, tends to destroy the patient. This is clearly to be understood, if it be admitted that the oxygenation of the tissues is indispensable to life, which cannot exist except in the presence of oxygen.

The mouth and nostrils are the orifices, or stigmata, through which the vital air has access to the lungs, whence it is taken up by the blood, in order to be given out in the capillaries.

In strictness, the nares are the respiratory stigmata, and an instinctive sense teaches the new-born child to use them alone. Hence, whatever causes serve to diminish their apertures, serve either to diminish the volume of air taken in at each aspiration, or to cause greater effort of the machinery of the aspiration.

When one of the nostrils of a neonatus becomes stopped by dried phlegm, by crusts and scabs on the orifice, or by any foreign body detained within it, a certain degree of respiratory distress is the consequence, because the instinct of the child leads it to respire only by the nares, and not by the mouth. Such respiratory distress is caused, partly by the lessened aëration of the blood, and partly by the fatigue or exhaustion consequent upon extraordinary exertion of the respiratory muscles.

Under these circumstances, should the other nostril become obstructed, or wholly occluded, it will happen, in many young

children, that they shall persist in their efforts to respire only by the obstructed nasal passages. In such a case, after making two, three or four attempts to respire in vain, the infant starts forward, throws its hands wildly abroad, and opening its mouth and throat, admits the air in a large stream into its lungs, and then immediately resumes its efforts to breathe through the obstructed nostrils again.

The nasal apertures of a young infant are so proportioned, as to admit a volume of air, at each aspiration, sufficiently copious to aërate the blood in the pulmonary capillaries. If one of the nostrils should become totally obstructed, the introduction of air into the lungs is, in so far, diminished, or rendered difficult and laborious. The child labors for its breath, using the unobstructed nostril.

A child that breathes by only one nostril, imperfectly adapted, as it is, for the admission of a volume of air sufficient for its aëration, is, as to its aëration, virtually in the same kind of distress as one laboring under the early stages of pseudo-membranous laryngitis. If, in the progress of the case, the free nostril should also become obstructed, the difficulty of breathing would become much more manifest; and although the patient might not immediately die, it would insufficiently aërate its blood, because it always repeats the instinctive effort to respire by the nares, failing in which, it opens the mouth and fauces, and, with a sort of respiratory agony, inhales the requisite amount of air, and then renews its attempt to breathe through the nares alone. One full aspiration by the mouth relieving its present and most pressing want, leaves it again to the dominion of its instinct, which is, to respire, as before, through the occluded nostrils only. But it is manifest, if this representation be correct, that such imperfect and long-intermitted respiration will not suffice to aërate the blood, and that an impure current, partly oxygenated, partly carboniferous, in the brain, will at length lay the foundation of irregular innervations, putting the child's life into danger, and which, if continued to a certain extent, must bring it to its close.

It appears to me, that any person, it is indifferent whether he be a physician or not, may readily obtain an idea of the kind and degree of respiratory distress, that is produced by two or three vigorous attempts to breathe through a closed nostril, in the following manner:—

Let the person close both nostrils, by pressing the alæ with the finger and thumb, closing, at the same time, the mouth, and persist, for some fifteen or twenty seconds, to respire through the closed nares; and then, suddenly opening the mouth, let him make the aspiration through the fauces. It is evident, that all the sensative cords of the pneumogastric nerve are, in this way, at once put in a sort of agony, and it is not to be believed, that the sensative cords of this important nerve can be distressed, without involving the motor cords in some congenerous trouble.

Slight affections of the parts innervated by the great vital nerve, are sufficient to derange the entire economy, and I doubt not, that consecutive attempts of this kind, repeated for two or three days, may destroy a full-grown man, and much more readily, a newborn infant.

A few years since, I attended a lady in North Tenth Street, in this city, who gave birth to a healthy, though small and delicate, child. It did well for some days, and then became affected with the slight coryza so common among neonati, on account of which it was kept warm, and the monthly nurse applied the usual remedy, of greasing the nostrils at bed-time. The mucous secretion of the coryza gradually collected about the apertures, and formed tampons, or plugs, which filled up the entire nostrils, as completely as if they had been filled up with a vial cork. The parents found the child apparently dying, and members of the family, from different parts of the city, were assembled to witness the decease of their young relative.

Being notified, by an urgent message, of the dangerous condition of the young infant, I hastened to the house, and finding the friends solemnized by the approaching event, I, also, was at first convinced that the child was about to perish.

It breathed after very long intervals, during which there was no apparent attempt to respire; and I noticed, that when it did make its aspirations, they were very sudden, rapid and violent, after which it relapsed into its non-respiring condition.

I did not understand the nature of the case, but I remarked that it could not be spasmodic nor pseudo-morphous laryngitis, nor, indeed, any laryngeal affection, because, when it did respire, it did so with full freedom and perfection, which could not be predicated of any affection of the larynx, of the bronchi, or the lungs.

In the doubt in which I was placed, I took the child on its

pillow upon my knee, in order to inspect it more closely; an inspection which left me no room to doubt that the obstruction was in the nares, and upon a closer examination, I found that the nares were entirely stopped up, as I before remarked. By means of the head of a pin I removed the plug from the external nostril, but I could not free the deeper parts of the passages.

Seeing that the child was about to die—and I have, at this moment, no doubt that it was, but for the rescue, within half an hour of its death—I lifted it in my hands, and, applying my mouth to the nostrils, and blowing violently into the openings, I loosened, and discharged the plugs into its pharynx, after which it was in a few minutes perfectly well, and I had no further trouble with it.

I saw a little child perish in North Sixth Street, a few years ago, from this cause. He had great aspirations at long intervals; the nostrils were entirely closed, not by mucus, but by sub-mucous infiltration, bringing the sides into contact, and closing the passage. As long as I could sit before him, preventing his tongue from touching his soft palate, and keeping his lips from closing, so as to admit air into his larynx, the child was perfectly well; but as it was impossible, on account of his resistance and struggles, to sit before him with a spoon upon his tongue, for many consecutive hours, it was necessary to abandon him to his fate, and he perished a few hours after I left him, persisting in attempts to breathe through an impracticable passage in his nostrils.

I saw a fine child, nearly two years old, perish, in January, 1845, from nearly a similar cause.

Perhaps the reader, perhaps some spectator, might doubt the propriety of the explanation of the cause of death in these cases; I recommend such cavillers to repeat the attempt of persisting to breathe through the nostrils closed by the finger and thumb, after which all doubts must vanish from the mind.

Dr. Underwood, in the *Phil. Ed.* of 1818, at p. 17, treats of coryza maligna, or the morbid snuffles. In his article upon this subject, he refers to a paper by Dr. Denman, who, in noticing the discharge from the nostrils, appeared to consider the most prominent symptom of the disease to be, the difficulty of breathing through the nose; a difficulty which, he remarked, was not constant, or which, being absent, left the child, apparently, in no danger. The truth is, that, in these cases of coryza neonatorum, although the instinctive tendency is to breathe through the nostrils,

in which it resembles adult persons, children will not be found always to obey this instinctive law, and without any considerable change in the state of the coryza itself, the sufferer will be found, at times, to render itself comfortable by breathing, as it can breathe, with perfect facility, through its mouth and fauces, and then, relapsing into its original tendency, it persists in breathing through its nose, until, in some cases, it dies, as I have stated.

Dr. Denman appeared to have noticed this peculiarity, for he observed, that while the child was free from the difficulty, there was no apprehension of danger, while at other times, the danger was clearly so great as to require an attendant to watch over it, both in sleeping and waking, in order to open the mouth as often as might be required.

Now, if any practitioner should rely upon relieving the patient by simply disparting its lips and gums, he will be likely to fail in his attempt, inasmuch as the child makes a valve of the back part of the tongue, keeping it against the velum pendulum palati, thus completely occluding the orifice.

Underwood says, that in the course of eight months, Dr. Denman attended eight children afflicted with this disease, six of whom died. Mr. John Hunter and Everard Home opened one of the bodies, and discovered nothing, except that the Schneiderian membrane was of a dark-red color, and its blood-vessels more turgid than common.

I can by no means agree with Dr. Underwood that the disease is to be safely treated by absorbents and slight purgatives. It is a Schneiderian disease, and it may be quite necessary and reasonable, in the progress of it, to assist the child to carry off large quantities of viscid mucus, often disagreeable in its odor, which falls into the pharynx, and, being swallowed, cannot fail to produce a highly saburral condition of the stomach. But I am far from supposing that the disease is gastric in its character. I believe a leech applied to each nostril, would be far more efficacious in mitigating its violence, than any internal treatment whatever. As I before remarked, the danger to the child arises from one of two causes, of which the first and most common is the filling up of the passage with a plug of dried, viscid mucus, and the other, a sub-mucous infiltration, causing the sides of the cavity to collapse. I would here observe, that the viscosities produced within the nostrils, will rarely be found to begin to dry,

except at the very orifices; those that are deeper-seated being kept moist and fluid by the abundant supply from the sources of excretion; whereas, those that are nearer to the orifice, are subject at their outer or lower extremity, to become inspissated, and to dry into firm scabs.

Now, for the treatment of this affection. It is an almost invariable practice, in old women and nurses, and young mothers, to grease the child's nose, as it is termed, generally with tallow, or some ointment; sometimes with rabbit's fat, or, as Van Helmont calls it, "the fat of an hare." In order to prevent the inspissation and exsiccation of the outer portion of the mucus, it is well to grease the child's nose, but the ointment should be applied to the internal, and not on the external surface, where it can do no manner of good. Olive oil does not answer well for this purpose; it becomes rapidly rancid in the air and in heat, and is vexatiously irritating to the parts; it is always better to select an animal oil, and, I think, nothing can be found more apposite to the circumstances than the ointment of cucumbers, which is exceedingly cooling and emollient, and just sufficiently adhesive for the occasion. A portion of it, as big as a pea, should be placed on the palm of the hand; a full-sized fitch pencil should take up a sufficient quantity of this ointment to fill the brush, which should be drawn to a point, and thrust into the little child's nostril, after it has been carefully cleansed, and delivered of its phlegm.

The effect of this application would be, to cover the lower part of the aperture with a thin glazing of animal oil, upon which the viscosities will not rest and dry, but fall outwards upon the lip, whence they may be readily wiped away; whereas, upon the dry epithelial surface of the orifice, the viscosities adhere, become inspissated, and convert themselves, as before stated, into hard, dry and solid crusts or scabs.

In advising as to the mode of dressing young children, I have for years past recommended the parent not to put any cap upon the child's head, whether it be born in the cold, the variable, or the warm season. I do not believe that a child dressed with its head naked, is, in general, more likely to be attacked with coryza than one dressed with the ordinary lace cap, or muslin cap, which is still in use among a considerable part of the population. But, in all cases of coryza, whether the child have a muslin cap, or whether it have a naked head, I have been accustomed, for a long

time past, to direct that a light flannel cap, fitting closely to the head—not loosely—should be applied, and worn until the coryza disappears. In a very considerable number of instances, I have found the warmth of a flannel cap, worn upon the head, sufficient speedily to cure the malady, and I beg leave to assure the reader that, for the most part, I have found little else to be done, beyond giving very clear directions as to this method, which deserves rather to be called a cure, than a method of treatment. I must beg to refer those who would seek for more elaborate prescriptions to the formal works; in the meantime, very confidently assuring them that few cases of coryza neonati have resisted the treatment by the flannel cap.

There is no child attacked with the disorder, ever so slightly, that should be treated with indifference, for wherever the malady attains to a certain degree of intensity, the life of the infant is not to be considered safe, and there is, at best, a great degree of discomfort, not for the patient alone, but for the parent also, even in the slight cases.

CHAPTER V.

BOWEL COMPLAINTS.

Before proceeding to speak in detail upon the bowel complaints of children, I propose to offer a few remarks upon the alimentary organs, that may assist me more clearly to illustrate the meaning and intent of what I shall afterwards say upon the special topics.

Although the alimentary canal comprises the entire tractus of organs extending from the mouth to the extremity of the rectum, including the stomach, and the small, as well as the great intestine; and though, in strictness, we ought not to exclude from the physiological consideration of it, certain notions as to the part taken in digestion by the liver and the pancreas, it appears to me that we may have a very concise idea of it, when viewed as a

mucous cylinder, which, in the adult, is about forty feet in length, by an average breadth of between three and four inches, giving a mucous superficies of more than ten feet. This mucous surface is the digestive membrane.

We ought not, however, in taking so concise a view of the alimentary canal, to omit a reference to the complicated structures that assist, and concur with, the mucous tissue, in the performance of the digestive acts.

For example, the ganglionic system, that mainly supplies these organs with nerve-force, is allied to the cerebro-spinal order of innervations so extensively, as to subject both systems to the risk of disturbance, whenever any malady happens to attack the essential digestive tissue, while that essential tissue itself is also liable to derangement, both in its physical nature, or crasis, and in its functional force, by causes acting originally upon the brain or sensorium or ganglionic nerves. It appears hardly necessary to cite the trite examples of a nausea and vomiting induced by a blow upon the head, or, vice versâ, of a pain in the encephalon, produced by a bilious or mucous saburra of the primæ viæ.

Viewing the nervous mass of any creature as the real, the essential Ens, it would follow, that a disordered or unhealthy state of that nervous mass, whether it be ganglion or nerve, or brain, must be in some, and, perhaps, in very numerous instances, the prime cause of the malady—a malady whose phenomena, or whose manifestations, are only to be seen and demonstrated in the tissue or organ that is a mere agent and laboratory of the special nervous mass in question.

In a general conspectus of the alimentary organs, it is necessary to inquire into the nature and state of the lacteal and lymphatic absorbents, as well as of the secreting glandules, and mucous crypts and follicles, by means of which it is lubricated within; and any of which may become seats of disease.

Again, the moving powers of the intestine are dependent upon the peristaltic muscles, which are numerous and powerful, and which in health appear to be ever active, never needing repose. So great is this activity, that it is probable large portions of the muscular apparatus are ever moving while the individual is in health; so that, in all such persons, some muscular contractions are always going on in some portion of the bowels. When the whole tractus is at rest, the individual is not in health.

But the mucous tissue, the glands, the muscles, and the nerves of the bowels, would remain without any force or action, but for the blood that circulates in their sanguiferous tubes. It is worthy of observation, that, notwithstanding the vast dimensions of the digestive surface—ten superficial feet at the least—the whole torrent of blood with which it is supplied is appropriated to it alone, escaping from the general reservoir of the systemic aorta, by the three digestive arteries.

I call them digestive arteries, since they are clearly consecrated to the purpose of digestion, and since the whole stream that issues from the large apertures of the cœliac, the superior mesenteric and the inferior mesenteric, is propelled upon the digestive organ, and upon it only; and since, in its capillary distribution, it furnishes not only all the secretions that lend a chemical aid to the acts of digestion, but keeps alive the development force of all the tissues among which it courses, and to which it imparts its oxygen.

There is further to be made the reflection, that all the arterial blood of the three digestive arteries, that is collected by the nascent radicles of the mesenteric veins, comes to be poured, at last, into the portal sinus, whence it undergoes a second distribution in the hepatic portal capillaries, where, being collected, it finally re-enters the general venous cyst, at the inferior cava, and so to the pulmonary heart.

In addition to all these, we must know that there is an abundant cellular tela, and more than that, an enormous expanse of serous or peritoneal membrane, which limits the bowel exteriorly, as the mucous coat bounds it internally.

Having made this inspection of the very complex apparatus that is provided in aid of the digestive membrane, one may clearly perceive that the disorders of the alimentary system are various, and that they may be affections either of the mucous membrane, its crypts and glandules; its nerves, its muscles, or its sanguiferous and absorbent tubes; or its cellular, or its serous apparatus.

It is easy to imagine that any causes that should modify the state of the circulation in the intestinal capillaries of the digestive arteries, might greatly affect the condition of the hepatic portal system, and vice versâ. For example, a solidified liver rendering the return of the portal blood to the cava very difficult, or in some degree impossible, might determine a state of chronic

engorgement of the distal capillaries of the mesentery, or even lead to fatal excretion or effusion of blood into the intestinal canal.

In like manner, the disorders of the bowels might well be looked to as causes of the suspension of the hepatic functions, or, at least, of great modifications of their rate; as, for example, in Asiatic cholera, in which it is a rare event to observe even the smallest portion of bile in the wasteful evacuations by vomiting and stool—presenting a case not very dissimilar to that of cholera infantum, in which the most exhausting colliquation of the bowels seems to preclude any biliary secretion, on account, perhaps, of this, viz., that all the excretable portions of the digestive circulation have been already thrown off in the alimentary tube, leaving only what the writers of the renaissance would probably denominate a dry and adust blood, to flow in the hepatic portal capillaries.

It is well known, that, in some of the mucous and muco-serous bowel complaints, the appearance of bile is to be hailed as one of the signal precursors of a cure.

But, as I have no intention to make a dissertation upon pathogeny in this little volume, I shall now proceed to some observaations of a less general nature, upon certain of the alimentary disorders of young children, and first:—

In the human being, as well as in all other mammalia, the offspring comes into the world dependent for its early supply of nutriment upon the secretion of the mammary gland of the parent; and it is a law of nature that an abundant supply of nutriment shall not be prepared until some hours after the birth of the new creature.

Physicians ought to reflect upon this law as founded in that sure prevision which has co-ordinated all things of this world for the perfect production of a necessary end.

In the human female, the expulsion of the fruit of the womb allows the gestative organ to return towards its non-gravid condition; and from the act of expelling the child, which has reduced it from the gravid state, to the condition of the uterus some ten or fifteen hours after delivery, it is so greatly altered as to its power of receiving and discharging the blood sent into it by its arteries, that one will have no surprise to find new and powerful sanguine determinations the result of the sudden cessation of long accus-

tomed uterine affluxions. The new determinations, ordinarily and normally, take place towards the mammary glands, and it is not, as a general rule, until towards the third day, or seventy-two hours after the labor, that the mammary gland begins to yield its first and richest abundance of nutritious food.

A child just born is therefore clearly not designed to be put at once to a breast filled with milk, because the wise prevision of nature would undoubtedly have furnished it with an abundant element at the moment of its birth, had such provision been really necessary for it. Now, if these observations are founded upon the truth of nature, it appears to me that we have a fair inference from such a truth, that the young child should not be filled with food immediately after it is born, and yet, of the thousands of children that are yearly born in the United States, the exceptions are few and far between, of those whose stomachs are not crammed with some pernicious mixture of molasses, or sugar, or honey, or grease, or gruel, within little more than half an hour after they come into the world.

Physicians know that a child is made for the milk, and the milk is made for the child, and that the milk is not prepared for it until the third day.

Now although the American new-born baby does not die from taking molasses and water, he is, in nine cases out of ten, attacked with dyspepsia, gastric acid, and phlegm, from which he suffers immensely during the month, and perhaps during his whole future life, and from which he might escape were the clear provisions of nature's law fully understood and implicitly obeyed.

God is wiser than man; and as the laws of nature are but the dicta of his will and of his benevolence, we can never err if we clearly hear, understand, and fulfill them.

A new-born child undoubtedly comes into existence with many instinctive desires and appetites, the most powerful of which is that for the ingestion of food. I have on many occasions applied a new-born child to the breast of the parent, within a quarter of an hour after its birth, and have observed it with the greatest avidity, perform the act of sucking as perfectly as if it had been accustomed to it for months.

There are few women in whom the breast fails to furnish a few drops of whey-like fluid, which, together with its own saliva, swallowed by the child, serves to satisfy its instinctive cravings;

and, if the application to the breast be repeated from time to time, as often for example as once in three hours, such a proceeding serves not only to appease the infant itself, but also in a remarkable degree to promote the development of the granules of the mammary gland, by stimulating the nipple. There is doubtless a moral influence produced by the application of the child to the breast, which reacts in a powerful manner upon the physical forces which are supposed to determine the secretion of milk; and the woman's milk may be generally expected to come more easily, certainly and safely, if the nurse applies the child early to the breast, than if, under some imaginary conception of her duty to it or to herself, she defers it to the second or third day. It is certainly not a rare occurrence, that a woman who loses the child in the birth, fails wholly to furnish any milk—and it is equally obvious that the emotions of the parent's mind relative to her offspring, exert a powerful influence to promote the more abundant secretions of the breast.

I know not, and I believe it is not known, whether any peculiar function or power is connected with the ingestion of the early milk of the mother, a fluid known to be characterized by the presence of a large quantity of colostrum, but it is understood among the agricultural class, that the ingestion of milk of the cow, which agrees well with the new fallen calf, is unwholesome to human beings, being likely to produce disorders of the stomach, accompanied with purgings.

M. Rainard, in the *Traité Complet de la Parturition des Principales Femelles Domestiques*, tom. ii. p. 151, after speaking of the milk fever that occurs also in the cow, says that the milk fever in this animal is far less decided than in the human female, and that the symptoms of the malady are most apparent in those cows that furnish the greatest abundance of milk. These observations of M. Rainard show that a similar effort of the constitution is required in the domestic quadruped, and probably in all the mammiferous quadrupeds, to that which is required in the human female, and it appears to me to be a direct accusation against Providence to suppose that the tender young, the object of so much care, should be left unprovided with an element deemed by the vulgar so essential for it at the moment of birth. It appears to me that it teaches us, as to the management of the early infant, a lesson whose doctrines are not to be gainsaid, and that those

physicians are absolutely right, who forbid the monthly nurses to give to the new-born child pernicious mixtures of molasses, and sugar, and other substances, which cannot fail to ferment, giving rise to the evolution of great quantities of acids and of gas that torment the little sufferer, and require to be afterwards cured by the administration of drugs scarcely less pernicious than the food itself.

The rule, therefore, should be not to feed the new-born child, but to wait until the food provided by nature as a true generical aliment shall be produced.

It is very true that if the mother be lost, or if she give no milk in due time, a succedaneum must be provided, which should be as nearly like the mother's milk as possible. A newly-born mammiferous animal requires for its nourishment proper quantities of cream, which is oil; of casein, which is cheese; of albumen, which is white of eggs; and of water. These are generical for it; and, if the mother or the dam cannot supply them, as near an approach as possible to the qualities should be provided for it by taking the food of some other mammiferous quadruped.

To show the variety and differences of milk, it is only necessary to appeal to the chemists.

In cows' milk Simon found:

Of Water	857·0
" Butter	40·0
" Casein	72·0
" Sugar and extractive matter	28·0
" Fixed salts	6·2

In asses' milk he found:

Water	907·0
Butter with metallic acid	12·10
Casein	16·74
Sugar with extractive matter and salts	62·0

In goats' milk there has been found:

Water	868·0
Butter	33·2
Casein	40.2
Sugar	52·8
Salts	5·8

In the milk of the ewe:

Water	632·0
Butter	58·0
Casein	15·30
Sugar	42·0
Cream	115·0

In the milk of the bitch, the analysis gave:

Water	657·4
Butter	162·0
Casein	174·0
Extractive matter and Sugar	29.0
Fixed salts	15.0

Milk is the nutriment of young animals. There may be found for it a succedaneum, yet it will be only a succedaneum. A proof of the highly nutritious nature of this substance may be found in this, that a young elephant which at birth may weigh 200 or 250 pounds; in a few months will come to weigh 650 or 700 pounds, living solely upon the milk of its dam. It is said that the young of a Balæna Mysticetus is more than 20 feet in length at birth; and attains a vast size while depending solely on the milk of the dam.

Goat's milk, cow's milk, or asses' milk, is a better substitute for mothers-milk than gruel, arrow-root, or any other artificial aliment. Simon gives at page 51 of volume II. of his work, five of his own analyses of the milk of the human female. I will take one of them for all. Let it be the third, which makes it consist of:

Water	898·0
Butter	28·8
Casein	32·0
Sugar of milk and extractive matter	36·0

If this be compared with the analysis of cows' milk, it will be found that the water in the cow's milk was 857·0, and the butter 40·0, while the casein was 72.0, and the sugar of milk and extractive matter 28·0; nearly double the quantity of casein, and a greater quantity of sugar, and a smaller quantity of water.

The comparison of the cow's milk with the milk of the human female, showing the greater quantity of casein, may serve to explain the fact, that, in the substitution of cows' milk for the mo-

ther's milk, the child gets a greater quantity of casein, which may account for the frequent occurrence of indigestion after the use of the substitute. It is doubtless the casein which most commonly disagrees with the young child, and not the creamy or oily portion; this is shown by the examination of the napkins of the infant, on which, under circumstances of serious indigestion, are always found masses of casein or cheese. Sometimes these portions of undigested cheese are hard, white, resembling new cheese that is bought in the market—evidently a casein insoluble in the stomach.

There must be some proportion, or some relation between the proportion of cheese in cows' milk, asses' milk, &c., and the digestive force of the young creature of each such animal respectively; a relation accurately and justly adapted to its wants and its powers; the medical man, therefore, who prescribes a diet, a succedaneum, should endeavor to bring the relations of the constituent elements, as nearly as possible, into accordance with the generical nature and wants of his little patient. By adding water and cream to cows' milk, the proportion of casein may be reduced, and the mixture brought into a close approximation to the nature and quality of the milk of the human female. I have known some physicians to prescribe a tablespoonful of cream, with half a cupful of water and a teaspoonful of sugar, as the sole support of a young child deprived of its mother's milk; it appears to me that this is a serious error, since it is an error to omit in the composition, some proportion of casein, which probably contains more protein than the other parts of the milk; the more particularly as in taking off the cream, there must be left behind all the albumen.

In confecting the artificial diet of the young child, in addition to the caseous and butyraceous elements, experience shows that it is safe to make use of some one of the various kinds of fecula, such as the arrow-root, tapioca, or sago, and also some of the farinaceous articles, which in many children, are found to answer perfectly well, and to effect rapid development, without producing sourness and indigestion, provided there be always a proper proportion of the materials which nature provides for all the mammals.

A young child, whose diet consists principally of milk, might, under such circumstances, be fed two or three times a day, with gruel, prepared from oat-meal; or, gruel prepared from rice, with many children is found to answer perfectly well. Barley water, well prepared and mixed with milk, forms a combination of vege-

table and animal aliment, which, for many children, is highly salutary.

It is customary in the use of these articles, to change them from time to time, with a view to diminish or increase the amount of peristaltic and intestinal action. A diet of milk, of oatmeal, of barley flour, is more likely to prove aperient to the child, than one composed of wheaten flour, of rice, or of crackers; the rule so often cited, however, as from the lips of our venerated citizen, Dr. Samuel Powell Griffitts, is one that ought not be lost sight of, that is, "It is well to let well enough alone;" if a child, therefore, is doing perfectly well upon a system of alimentation, one ought not to incur useless hazard in changing that which is well, in the hope of finding something that may be better.

As to medicine for the new-born child, it must be admitted, that to give medicine to a child, because it is young, or because it is new-born, is utterly preposterous, yet, so far as my experience goes, there are great multitudes of children who are compelled to take a dose of nauseous physic within forty-eight hours after their birth; which is given under the impression, that it is necessary in order to discharge the meconium, or under some notion that it must have physic because it is new-born.

The meconium is a dark-colored—almost black—greenish and viscous substance with which the colon and rectum of a new-born child is ordinarily found to be filled; a considerable quantity may be observed in the colon of a child under five months in the womb. The quantity in some new-born infants is very great, indeed; so considerable as greatly to distend the whole of the large intestine: it is often discharged into the womb in labors, and there are few cases of breech or footling births, in which it is not found to escape before the completion of the act of parturition. I am under the impression that, in most children born, dejections of this meconium will be found to take place within twelve hours after the infant has come into the world, and it is considered rather out of the rule, for the child not to have one or two copious evacuations in the course of the first day. As this meconium is found in the large, and not in the small intestines, it is easy to perceive that a very considerable action of the bowel might be capable of discharging the whole of it in the course of two or three operations, whereas a torpid or comparatively insensible alimentary tube

would discharge *it gradatim*, and fail to get rid of it in the course of even two or three days.

As soon as the black matter passes off, its place is taken by a yellow substance which descends from the duodenum and jejunum, passing through the ileum into the colon, and giving rise to the bright yellow-tinted dejections of the new-born child. When the meconium comes off freely and entirely, as is known to be the case when it is chased away by the bile-tinted product of the small intestine, it is clearly unnecessary and inexpedient to administer medicine for the production of an effect already produced; and in fact it is very desirable, in the young child, as it is in all persons, to withhold the exhibition of drugs and medicines except upon a clearly perceived reason, and marked necessity for their employment.

It appears to me to be an outrage to give a child a dose of castor oil, or rhubarb, or magnesia, when it is not really required; for such articles cannot be taken into the stomach without exciting the beginning of trains of actions, whose end no man can foretell; and, though it is true that a dose of castor oil will in the general operate only some three or four times, it is also true, that it sometimes produces very distressing gripings, which are evidences of violent disturbance in the innervations of such important textures: but a new-born child ought not to be exposed unnecessarily, to the risk of violently exciting the nervous mass of its alimentary organs. Those physicians, therefore, who dispense with the use of medicines, until they are clearly called for by the urgency of the distress, or some symptoms of disease, are in my opinion the most commendable.

On the third day, as has been before mentioned, the breast glands of the mother are filled, and the production of milk is so great, that the young child is frequently found incapable of absorbing the whole of it. If the breast be what is called a good breast, or one that is easily drawn, one in which the galactophorous tubes are easily produced by the sucking of the child, its stomach becomes rapidly filled with a mass of milk which distends it to its utmost compass: many children, under these circumstances, have the happy faculty of rejecting the excess. Such children, after having been applied to the breast, are found to pour out over the under lip, without vomiting, but by a kind of eruc-

tative force, a sufficient quantity to leave the stomach comfortable, not uncomfortable from a state of inordinate distension.

But there are a great many children who have not this ready faculty of relieving the stomach of their excessive ingestions. Now in these little creatures, the excess passes off through the pylorus before the changing action of the stomach can be exerted upon the mass; the duodenum, the jejunum, the ileum become filled, not with chyme, but with milk, which, having been more or less perfectly coagulated by the rennet-power of the stomach and duodenum, passes off into the colon as whey, or as granules, or as flocci of casein, giving rise to numerous discharges upon the napkins, which are mistaken for diarrhœa. The physician being summoned, and being told that the child has had twenty napkins per day, is more apt than not to imagine that so great a diarrhœa is the result of disordered muco-secretions or muscular action of the absorbing intestine, and the child, if it gets a dose of calomel, or rhubarb, or castor oil, or some other aperient, is wrongfully prescribed for, since it requires a hygienical, and not in the least degree a therapeutical treatment. Such a child, if left in the hands of nature, will, in a short time, come to be able to make use of the whole amount of its ingesta; or, the breast itself will change the rate of the producing power, so as to give the child all it wants and no more, upon which the supposed diarrhœa will disappear.

I have been called to see children afflicted with such a supposed diarrhœa to the amount of twenty napkins per diem, many of which, being reserved for my inspection, have exhibited no signs of bilious or mucous disorder. The absence of such physical signs, and the presence of all other signs of good health and complacency in the infant, has invariably disarmed me of my purpose to treat it with a strong hand; nor have I met with any embarrassment from the difficulty of persuading the anxious parent that the malady was more seeming than real, and that therapeutical remedies, by means of which such discharges could be arrested, would prove not only unnecessary, but dangerous. For I have shown her that the reasonable mode of treatment consisted in diminishing the amount of ingesta, by putting away the child from the nipple whenever she should deem it had taken a sufficient quantity, and in never allowing it to gorge itself *ad gulam*.

It is not difficult to make the diagnosis in this case, because,

by a little careful inquiry into the state of the breast; as to the draughts that come into it; as to the magnitude and fullness of the breast before it is given to the child, and as to its flaccidity after the child has taken it; as to the number of times per diem that the infant is admitted; and, more than all, by a careful inspection of the product of the dejections—to determine the point of necessity, whether as for prescription, or as for abstaining from it.

But children are often affected with diarrhœa and gripings. Sometimes the acid which occurs in the early stages of the phenomena presented in the gastric and intestinal series of digestions, is excessive in quantity: the presence of such substances in those delicate passages, is not unlikely to produce purgings by irritating and titillating the impressible extremities of the digestive nerves; whereupon they provoke abundant secretions of mucus, and excite the whole series of arteries and capillaries that carry the blood of the intestinal canal, the vena portæ and the liver; so that the presence of excessive quantities of acid may naturally be expected to derange the action, not of the muscular coat of the intestines only, but of its mucous coat, as well as the liver, whose condition is often determined by the state of the portal circulation.

I do not apprehend that the liver ever produces green bile; but it may produce an excessive quantity of yellow bile, whose nature may be vitiated by hepatic irritation, and this yellow bile, poured out through the choledoch into the intestinal tube, strikes a green color on coming into contact with the colorless acids of the stomach and duodenum; so that all the alvine discharges that take place from the young infant are colored green—green as verjuice, green as a leek—of various shades of green. Whenever such color of the stools is perceived, it is to be taken for proved that the child has acidity of its primæ viæ: it has not green bile, but it has yellow bile which strikes a green color on being mixed with acid, precisely the same tint being produced out of the body, by mixing the pure yellow bile with acid in a wineglass.

It must be evident that the presence of an excessive quantity of acid in the primæ viæ, cannot fail to irritate these tender membranes; and, as the production in some instances goes on notwithstanding very frequent and copious dejections, it is proper to provide some means for the relief of the suffering infant.

A child that suffers griping and spasmodic pains of the belly, is restless, expressing its discomfort by frequent and sometimes

protracted loud cries—by drawing up, and suddenly extending its limbs, and by a desire to relieve itself at the breast, upon which its demands appear to be as it were insatiable. In some instances a regular and steady operation of the function of the peristaltic muscles, sufficing to carry off from the primæ viæ the irritating matters, will soon relieve the child of the spasm, but, when the passages take place irregularly and imperfectly, it is proper to give one or more doses of aperient medicine. It is difficult, I should think, to find an aperient more suitable to effect this design than the castor oil, of which the dose is a teaspoonful or half a teaspoonful as the occasion may seem to require.

Some of the milder forms of disturbance, arising from the presence of acid in the primæ viæ, may be readily relieved by exhibiting several times in the course of the day doses consisting of a teaspoonful of lime water, mixed with as much milk or breast milk;—or by doses consisting of from one to three grains of the bicarbonate of potassa dissolved in a small quantity of spearmint water sweetened with sugar, which may serve to neutralize the acids of the stomach or duodenum.

If the action of the liver be not unhealthy, it will be found that the stools become tinted with yellow bile as soon as the cause of their greenness, namely the acid, is removed. Doubtless some of these cases of troubled primæ viæ may depend upon too great a susceptibility of the mucous membrane, and its muciparous apparatus: under such circumstances it is not imprudent to combine with the use of alkaline remedies and gentle aperients small portions of tincture of opium, of which the dose for a child within the month, ought not to exceed a drop, while the dose for a child under ten days old, is commonly to be deemed sufficiently large if half a drop be given at each time.

Many persons are fond of ordering, under these circumstances, a dose of calomel, to change, as they say, the action of the liver; and there is no doubt that the impression of mercurial doses upon the sensitive surface of the digestive organs, may serve on many occasions to alter the modality of the life-actions in those important viscera; but, inasmuch as the impression of mercury is occasionally very violent, and uncontrollable in acting on the constitution of the young child, it seems to me desirable to avoid its use except when the indication for its administration is clearly discovered. In the instance of an irritation of the primæ viæ of

a young child, attended with purging, crying, and uneasiness, and marked by frequent green dejections, we ought not always to accuse the liver of being in fault, since these circumstances are more frequently attributable to a faulty action of the stomach and duodenum, than to a status of the hepatic porta, or the hepatic artery, as agents for carrying on either the circulatory or secretory offices of the liver. More especially is the liver to remain free from any accusation of disorder, when the healthy tint of the child's skin, and the absence of a yellow tinge of its adnata, leave no valid reason to suppose the functions of the liver to be interrupted. Such cases, after the administration of one or two doses of some simple aperient, for example, may be more safely managed by means of the antacids before referred to, and by the proper absorbents, such as prepared chalk, or the prepared crab's eyes, or the prepared oyster shells.

In general, I apprehend, in the administration of the cretaceous articles, we fail in consequence of administering them in too small doses. Prepared chalk, when well washed and levigated, seems to me to be quite innocuous in the young child's stomach; and it is safely given in doses of three or five grains if well suspended in mucilage of gum Arabic, sweetened with sugar; to which also a small portion of cinnamon water, or spearmint, or peppermint, or any aromatic distilled water, may be added to make it agreeable to the palate and the internal organs.

In giving prepared chalk, I deem it a good method to direct the nurse to administer a proper dose, to be repeated soon after the recurrence of each green or sour dejection. Where a small portion of laudanum appears to be a desirable addition to the medicine, the proper quantity of that article should be added to each dose, and not to the whole compound; in this way it may be continued or suspended at the discretion of the prescribing physician or his agent.

A very suitable medicine for the young child affected with acid passages, in which there may seem an indication to carry off the whole contents of the alimentary tractus, is found in the pure calcined magnesia, five or six grains of which, suspended in milk, or in spearmint water, may be given from time to time until its aperient operation is perfectly effected.

But as a young child is generally by nature a glutton, and having only its instinctive desire for food as its guide, it often renders

itself sick by excessive ingestion. The medical attendant ought to make inquiry as to the frequency of its presentation to the breast, and the power of the nurse to supply copious or scanty streams of nourishment for it. Mothers frequently ask the question as to how often the child shall be applied to the breast: if the woman supply milk freely, to feed the child once in two hours is manifestly to do so too often; we not unfrequently find, however, that young mothers have the habit of giving nourishment to the child every time that it appears discontented, so that the organ of digestion has no time to rest; in such cases there is never a moment in which it can be quite contracted or emptied.

I do not know precisely how long a time is required for the digestion of a gastro-morphous coagulum of milk, equal in size to the greatest capacity of the stomach, but it is clear to me, that the stomach should occasionally be allowed to contract itself completely, for I cannot see how it can well maintain itself in perfect health, if it be not now and then allowed to contract, and condense all its tissues. As well might we suppose a urinary bladder to maintain its healthful condition, while prevented for a series of days or weeks from becoming completely emptied and condensed.

The stomach does certainly require intervals of repose from the sort of digestive crisis which takes place after each meal; it is probable that a healthy child, supplied by a breast at an ordinary rate, will be able to discharge the whole of the ingesta into its duodenum in the course of three hours. If this opinion be not incorrect, it would seem proper that the child should be allowed to go to the breast as often as once in three hours, and even in this case, if the supply be very copious, the mother should be advised to put the infant aside, whenever in her judgment, it has taken a sufficient quantity. A little hygienical precaution in these cases, may serve to avert the attack of indigestion, which often proves to be the first symptom of a long series of maladive affections.

CHAPTER VI.

ON INFANTILE JAUNDICE.

It is very common to find a new-born child affected with yellowness of the skin and adnata; the urine becomes yellow also in these cases; so much so as to leave its stain upon the napkins. These circumstances are sufficient, I think, to show that there is regurgitation of the bile, and this regurgitation must take place somewhere in the liver; for it will not be contended, I suppose, that the coloring matter of the bile is developed as such in the blood; it is the product of the secretory power, and, as the secretion can only take place in the biliary organ, to see a child's skin stained yellow, while its adnata and its urinary secretion also exhibit the same tint, is proof positive of hepatic obstruction.

The obstruction may doubtless, in some instances, depend upon certain pathological conditions of the ductus communis choledochus, conditions perhaps dependent upon viscosity of the mucus or bile at the orifice of the tube, or in the tractus of the tube, upon some engorgement of the submucous tissue of the tube, or of the submucous tissue of the intestine in the neighborhood of the tube, preventing the efflux of bile that has been properly secreted in the liver. I believe that there is a common communication between the tubes of the hepatic portæ and the hepatic veins, the hepatic artery and the porii biliarii, rendering it possible for hemorrhage to take place from the liver, from the branches of the artery, or of the veins, through the pori biliarii, and therefore rendering equally possible a regurgitation of bile with its coloring matter into the blood, which stains the white and transparent tissues with its peculiar hue.

I have not been accustomed to give myself much concern about the infantile jaundice, in a child, of whom the dejections have exhibited no morbid characteristics; for I have considered that the bright marigold hue or gamboge tint of the dejections, was to be taken as undeniable evidence, not only that the liver was carrying on its secretory action, but that the common choledoch was

pervious, shedding the bile into the duodenum, as in health, and leaving no doubt on the mind that the constant flow of bile into the duodenum, must at length suffice to relieve the liver of the condition which had led to the regurgitation into the blood. I have, therefore, allowed many a case of infantile jaundice to pass without administering for it a single dose of physic; for, I have not known what to give: under these circumstances, the exhibition of small doses of calomel I have thought more likely to disturb its digestive powers, than to relieve it from the obstruction, which promises in this way to be transitory.

But, where I have found that, together with the yellow stain of the skin from regurgitation, there has been reason to suspect that the flow of bile into the duodenum was obstructed, I have endeavored to perfect the diagnosis by all the means in my power. As a general rule, a child who does not secrete and discharge healthy bile into the duodenum, will constantly lose in weight, for the presence of the bile in the intestine is a condition necessary to the perfect performance of the digestive functions of the upper portion of the tube. The absence of bile in the alvine dejections is conclusive evidence of a suspension of the excretion.

Dr. Thomas Schwann has shown, by his series of experiments performed at Louvain, that animals become emaciated when the choledoch is tied up, and a fistulous orifice formed, through which the bile is discharged upon the surface of the body, instead of into the alimentary tube; and that the animal loses its life, if prevented from licking from the external wound, the outflowing product of the hepatic secretion. The presence, also, in the blood of a regurgitated bile, cannot fail to vitiate the physiological powers and functions of that important fluid, acting upon the nervous system to interrupt, and injuriously modify its innervative forces; hence, a true jaundice, with obstruction to the flow of the bile into the bowels, is a matter worthy of the attention of the physician, even in the case of the youngest infant.

In such a case, the child ought to be undressed and laid upon its back upon the bed, or held upon a pillow upon the lap of the nurse, in order that the physician may have a fair opportunity to explore the right hypochondriac and the epigastric regions. Many children are thus found to be what the nurses call *liver-grown*, that is to say, the liver is swollen and enlarged, so that its anterior edge projects far below the cartilaginous margin of the thorax, be-

coming perceptible when the fingers are pressed along that edge. If the child have been born in health, and be only a few weeks old, and, if upon making pressure upon various parts of the enlarged organ, it becomes evident that the patient feels no pain, and if, indeed, the whole series of phenomena present themselves without the attributes of an accompanying fever, there will be reason to regard the swollen state of the liver as a mere engorgement, and not as an inflammation of the organ.

I am unacquainted with the precise principles of the pathology of this condition; I am hardly willing to attribute it to faults of a simple excessive sanguine determination to the capillary termini of the hepatic artery; and it is equally difficult to assign as a cause for it, any affection of the hepatic veins; it is probably, therefore, a fault essentially resident in the capillary terminations of the hepatic portæ. It only remains to suppose that the sanguine engorgement is to be referred to a fault in the condition of the digestive circulations which issue from the aorta,—that is, by the cœlic and the two mesenterics,—hence, the farther inference that the trouble in the hepatic functions is pathologically connected with some faulty action of the capillary ramifications of the three digestive arteries above named, or of the venous capillaries of their second expansions in the substance of the biliary organ.

This leads us again, in considering the therapeutical wants of such a case, to inquire how far these wants can be answered and satisfied by such modifications as it is in our power to provide, in the arterial capillaries of this mesenteric system, by acting upon the digestive tube.

In speaking of modifications of the circulation in the hepatic portal capillaries, as well as in the capillaries of the digestive arteries ramifying beyond the mesentery and mesocolon, it should also be understood that the status, the modality of the life-action in these capillary vessels, is dependent on the perfectness of the nerve power conveyed into them by the distal extremities of their nerves of supply. It is certainly out of the power of medical men—notwithstanding they may admit that these health modifications are essentially nervous modifications—to have any other cognitions of them, than those derived from alteration in the volume, sensibility, or function of the part that may be in question.

To speak of a phlogosis or an engorgement of an obstructed

liver, is, in essence, to speak of a lost power in the nerves of that organ to maintain its dependencies in a state of health. The necroscopic scalpel is incapable of detecting changes in the nervous fibrillæ in question, although it readily detects slight modifications in the state of the capillary vessels, acini and absorbent and excretory ducts of the part. Therefore, when I speak of modifications in the circulation of the liver, as causes of these maladies of young children, I mean to be understood as speaking of the modifications of the nerve power of the liver.

In a case of evident infarction or obstruction of the liver in the young child—a case marked by sour purgings; by stools not colored with bile; by a yellow color of the skin and a yellow hue of the adnata; by a sort of hectic frequency and quickness of the pulse; by a hardness or tumour to be detected by palpation of the epigastrium, or of the right hypochondrium; by yellow bile-tinted urine, or other undeniable evidence of hepatic derangement—the aid of the therapeutist is clearly necessary. Baths, frictions, diaphoretics, regulation of the quantity of the food, careful choice of it as to its quality—to which end the nurse may be charged; —emetics, purgatives, topical depletion by means of leeches; what are called alterative medicines, and last not least, expectancy—comprise nearly all the resources of the physician against the case.

A bath in such case should scarcely be of a temperature lower than 96° F. Frictions, shampooing of the abdomen—using for the purpose of friction, olive oil, tempered perhaps by the addition of a small quantity of tincture of opium or some fine aromatic oil, such as oil of rhodium, oil of juniper, oil of cloves, or rectified oil of amber; or camphor or ammonia; these furnish legitimate grounds of expectation to favor the progress of the embarrassed circulations, and assist in setting free the course of the nerve streams of the disordered part.

As a diaphoretic, perhaps for the young child, nothing could be more suitable than the administration of wine or syrup of ipecacuanha, with a very small quantity of the sweet spirits of nitre. I hold it to be imprudent to administer to the child within the month, doses of Dover's powder, since the least carelessness on the part of the apothecary, might readily suffice dangerously to narcotize so young a subject; all the therapeutical force appertaining to Dover's powder can be obtained by the exhibition of

half a drop or a drop of laudanum, in combination with five or six drops of the wine or syrup of ipecacuanha—a far superior method of prescribing.

With a view to promote the diaphoretic operation of such doses as I have now mentioned, it should be deemed indispensable to render the child comfortable as to its dress; its napkins should be carefully changed whenever they become soiled or wet, and the dress also should not be allowed to chill the infant, a circumstance very likely to occur if it be left unchanged after being thoroughly wet up to the back.

In the United States our females are in the habit—even in the coldest weather, even in the variable seasons of autumn and spring—of dressing the child in the most improvident manner, exposing the whole of the arm, and half of the thorax before and behind in what are called low-necked dresses. An infant, so sick as to require to be put into the hands of the physician, ought to be put wholly under his control or guidance; and yet physicians often find it an extremely difficult matter to bring about the changes in the dress of the infant which they deem if not indispensable, at least most desirable. In regard to the class of affections now under consideration, I believe there will be found few dissenting voices to the proposition, that there is a great natural alliance and dependence, between the functional states of the skin, and the biliary organs, and that whatever here tends to check the exercise of the power of the cutaneous exhalents—to do which nothing is more powerful than cold and damp—ought to be most carefully avoided. The young child, then, in this view of the case, ought to be dressed with long sleeves, and with frocks high in the neck.

In children laboring under our disorder, great attention ought to be paid to the kind of food. These disorders are not likely to occur in children born healthy and nursed at the breast of a healthy woman yielding abundant supplies of milk; they are far more likely to be met with in those unfortunate beings, who, deprived of their mothers' milk, are fed upon such cows' milk as is brought into cities; upon gruel, and the various compounds called pap or children's diet.

The food for a child is the milk of a woman, not that of a cow, or a goat.—This proposition proves itself—it is self-evident.—Therefore, when the physician is called to such a case, one of the clearest items of his duty consists in this, namely, to return

the child under the influence of the laws of nature as to its diet, by directing to be procured for it a proper breast of milk, and forbidding utterly the exhibition of those wretched compounds, which, even the best of them are, after all, but miserable succedanea for a generical mode of alimentation. Where the circumstances of the parents will not allow the procuring the breast of milk, then the succedaneum must be submitted to. As I have already expressed my opinions as to the best modes of artificial alimentation, I have no occasion to speak again of that subject in this place.

Although mothers' milk is the proper aliment for the child, this it not true of every mother's milk; the milk of some women being poisonous to the infant—that, for example, of a woman who indulges in the use of strong alcoholic potations, cannot be salutary; she who labors under some vice of her constitution, whether tuberculous, carcinomatous, scrofulous, or other, is not fit to be entrusted with the alimentation of a new-born child. She who is subject to violent fits of passion, or attacks of hysteriform malady, produces milk which has in some instances been capable of casting the child into convulsions, and, *à fortiori*, of disordering its digestion.

In making out, therefore, the ordinances for the child, whether they be therapeutical, or whether they be hygienical, it behoves that an intelligent inquiry should be made into the nature and condition of the mother's milk, which, if both expedient and possible, ought to be changed for that of another woman. But even in feeding the child upon milk undeniably healthful, very careful directions should be given as to not overloading the stomach by too frequent indulgences, or too long continuance at the breast, as I have before pointed out.

In the very young child, one has a natural aversion to the exhibition of emetic doses, which seem to be too rough and too rude a therapia for so young a creature; nevertheless the young child vomits easily, and apparently without suffering so great a constitutional shock as is occasioned by a similar operation in the adult. Whenever the action of an emetic might be deemed useful, with a view to its power to emulge, as it is called, the excretory ducts of the liver, and to liberate the stomach from the thraldom of a mucous acid saburra, it will be quite lawful to exhibit an emetic, in the form of the wine or the syrup of ipeca-

cuanha, of which a few drops are given from time to time, especially if diluted with water; or, a weak infusion of chamomile would suffice to bring about the desired effect—or two or three grains of alum powder, mixed in a small quantity of honey slightly diluted with water, furnish us with an emetic dose as safe as a common salt water emetic; one which is, moreover, very prompt, and capable of exercising a salutary influence upon the mucuparous follicles and glandules of the stomach and duodenum.

As to purgatives, they may consist of infusions of rhubarb, or the simple or aromatic syrup of rhubarb; of magnesia or castor oil. They are administered not unfrequently, with a view first of exciting, and thereby steadying the peristaltic muscles, while they, at the same time, serve to free the child from an intestinal saburra of acid and phlegm, of imperfect bile, and residue of digestions, the which, being gotten rid of, it appears probable that the capillary circulation of the distal branches of the digestive arteries, as well as the capillary circulation of the hepatic portæ, will be set at liberty to obey the more healthful laws of their several innervations.

In this view these simple purgatives present to us the examples of most admirable alteratives; but, if the physician, unsatisfied with such a view of an alterative, should feel that he must resort to the alterative *par excellence*, let him exhibit calomel, or chalk and mercury, or the common blue mass, to be followed soon afterwards by one or another of the aperients before mentioned. It is probable indeed, that calomel, and other preparations of mercury, are endowed with an alterative power more potent than that appertaining to the above-mentioned lighter medicaments. No one, I believe, pretends that the far-famed alterative qualities of mercury are chemical qualities, and I believe that if it be really possessed of an antiphlogistic or an aplastic force, as they affirm of the articles of its kind, we ought to attribute it to the impression which it produces upon the sensitive nerves of the primæ viæ, modifying thereby their innervative force as expended upon the capillaries, the absorbents, and the excretory apparatus of this system of tissues.

Such modifications as these articles may introduce, cannot fail, it is evident, to produce changes, whether good or bad, whether useful or the contrary, in the rate of the secretions, and it appears to me very clear that melioration as to the quality or the

quantity of the secreted products of the liver, as well as of those of the alimentary tube, gives us just ground to hope for equal meliorations of the condition of the nervous, muscular, and membranous portions of these solids—the object to be held in view by the therapeutist.

With regard to the state of the bowels in the young child, it is not to be expected that after biliary evacuations have been produced by the influence of the alteratives which have been abovementioned, at least, it is not always to be expected that the child's health will be speedily restored; because irritation or debility of the stomach and duodenum may continue to admit of the development of too great quantities of gastric or intestinal acid; or there may be left in a portion of the intestinal tractus, an irritation of the muciparous follicles and glands, giving rise to abundant mucous secretions, which communicate to the stools a character of disorder, and the presence of which must interfere with the absorbing, as well as the digestive functions, of the alimentary apparatus.

We have the power, by means of various therapeutical articles, to quell this production of acid in its nascent condition. These means are the alkalies, such as potassa, soda, lime water, ammonia, prepared carbonate of lime in the form of the creta preparata, prepared oyster shell, chelæ cancrorum, and oculi cancrorum. The exhibition of such articles as these, with bitters and astringents of various kinds, enables us to rescue the child from the troublesome consequences of gastric and intestinal acid, and mucous saburra of the alimentary tube. For the patient within the month, doses consisting of two grains of bicarbonate of potassa, repeated two or three times a day, may be safely resorted to, or a similar quantity of bicarbonate of soda, or teaspoonful doses of lime-water diluted with an equal quantity of milk, or two or three grains of chelæ cancrorum, or oculi cancrorum, combined with five or six drops of tincture of krameria, or tincture of kino, constitute useful and safe combinations.

Under these circumstances, also, if it be found that the peristaltic fibres of the intestine be irritated, or easily thrown into violent spasmodic contraction, it is salutary to administer some portions of tincture of opium, of which the dose to a child, within the month, ought not to exceed half a drop.

And, finally, by expecting the child to improve, we often find

it to improve. It is doubtless necessary that the physician should carefully inquire whether there be really a necessity for therapeutical prescription, and where such a necessity is found to exist, he ought not to abstain from it, but I conceive there are many cases in which he deems himself called on to prescribe, which, with a little patient expectation, he would find to pass by without the administration of any medicines.

It is not to be denied that the homœopathists have, in these latter years, had the care of many sick persons, who have recovered; many of them, from severe or threatening maladies under their supposed therapeutical treatment, consisting of the administration of decillionths of a grain which are equal to nothing; it is clear that their patients, when they do recover, owe their recovery to expectancy.

CHAPTER VII.

OF THE CHILD'S DRESS.

The dress of an infant should be adapted to the climate.

In the climate of Pennsylvania, we have great and sudden transitions of temperature, during all seasons of the year; and the difference between winter and summer is extreme.

It is clear that young infants should be sufficiently protected against the cold of winter, and guarded against the morbific tendencies of sudden revulsions of the weather in spring and autumn; while it should be dressed in such a way as to add nothing to the debilitating influence of our protracted intense solar heat and light in the warm season.

In many families not the least difference is made in preparing the dresses of children to be born in February, or in August, which is plainly an error in hygiene not less gross than would be the applying of the same sort of habiliments to the children of Senegal, and those of Nova Zembla.

Certainly, I have reason to think that thousands of lives are

annually sacrificed to mere fashion in the dress of new-born children; whether of those that are born in the hot, or of those that come into the world in the cold season.

An infant should, after the first of June, here, and earlier in the southern states, be clothed in its belly-band, a flannel shirt, and a light frock low in the neck, and with long sleeves. A cotton sock should cover the foot. It requires no cap; but, when sent out for exercise, in the nurse's arms or in the carriage, it should be covered with a light surcoat, and hat or bonnet.

Those that are born after the 20th of September, and previously to June, should have in addition to the belly-band, shirt, and flannel petticoat, a frock high in the neck, with sleeves to the wrist, and long worsted stockings for the legs and feet.

It is difficult, I might say it is impossible, for a physician to oppose with general success, the powerful dictates of fashion or custom; and it will happen, therefore, that in a multitude of instances, in which he may experience a great degree of solicitude for the welfare of the young children of families under his medical care, he shall in vain recommend precautions as to dress, that seem not to coincide with the general opinions of society. In arguing in favor of his plan, he is sure to be met by the unanswerable argument that such and such children are dressed in the style to which he objects, and that it is impossible to see finer or more healthy children.

Many times when I have witnessed the pernicious or dangerous effects of improper modes of dress, as to certain children, I have found it bootless to persuade to a reformation of the style, because other children have not required the adoption of such a plan as that recommended. The cases are beyond computation, of attacks of illness, and of fatal seizures clearly attributable to the faulty methods of dressing used in the United States.

In Europe, the young children are clothed with dresses that come up to the throat, and that cover the arms quite down to the wrists.

Our aboriginal mothers always cover their infants to the throat, and I have seen many Cherokee, Ottawa, and Chippewa infants, even in warm wather, completely protected, except as to the head, which is left naked.

In Pennsylvania, the mutations of temperature are frequent and sudden, and violent; changes of thirty or forty degrees within a

period of twenty-four hours, being not very rare. Yet we find that the potent spell of custom and fashion induces a majority of our women to leave exposed nearly a moiety of the thorax, and almost the whole of the arms of the young child, at all seasons.

Assuredly, if any portion of the infant really requires protection, it must be those parts of the body that are least profusely supplied with arterial blood; and, since most of the blood of the arm is injected through the axillary artery, it is manifest that cold and damp can more readily exert their morbific and repercussive influences on a part so imperfectly injected by the heart, and so remote from the common source of the circulation and heat.

The brachial artery of a neonatus is a very small vessel, and the cold surface of an infant's hand and whole arm, cannot but require a perpetual effort of reaction against the evil tendency of the exposure. Such efforts of reaction, occurring in children irritable, of feeble constitution, having weak bowels, or prone to catarrhal disorders, are dangerous in the extreme; for in all such, it is only necessary to light the torch of fever in them, in order speedily to develop all the phenomena of inflammation. I am very confident in believing that great numbers of little children have had occasion to be put under medical treatment in my practice, solely because of the improper, imperfect, and disproportioned dresses in which they were clothed.

It is a common rejoinder, that of saying, the child must not be brought up too tenderly, and that it must be hardened. This is true; for, if a child be very warmly clad, and be also kept in well-warmed apartments, not properly ventilated, it cannot fail to acquire an hyperæsthetic habit, which is perilous in the extreme, for in that case it becomes obnoxious to almost every etiological provocation.

To such a rejoinder, the reasonable answer is, that the infant should be first well clad, and then daily exposed to the atmosphere; that men and animals were designed to live sub-dio—in the open air; and that it is incompatible, as a common rule, with good health, to be excluded from the influence both of solar light and the common atmosphere. Exercise, fresh air and insolation, though less indispensable than food, come next to it, in the order of the hygienical requisites. I therefore, in all cases, except in those of sick children, advise my friends to send their children to walk or ride in all weathers, believing, indeed, that even rain and

snow, and sleet, are insufficient causes for detaining a healthy infant in doors and in close rooms, for twenty-four consecutive hours. To dress a child like a fantastic doll, and shut it up, except in the most inviting weather, is, in my opinion, a serious error. The same child, properly dressed, might be safely sent into the open air even in a tempest.

As to the dresses of children in sickness, common sense dictates their adaptation to the cases.

In all families, where poverty does not forbid, there should be provided for each child at least one sick wrapper, a dress open in front, like a dressing-gown, provided with strings or buttons, to close around the neck, and with sleeves reaching to the wrist. For winter-service, such a wrapper should be double, with strings round the waist, that it may be conveniently and perfectly closed, so as to afford the most complete protection of the surface against direct atmospheric contacts, a protection most desirable in the pulmonic and intestinal disorders of young children, as well as in their exanthematous disorders. It is preposterous to see a child with hurried and laborious respiration, bandaged and pinioned by its ordinary day-dress; when, in fact, it most urgently requires that all obstructions to the play of the functions be carefully eschewed.

In numerous instances, where I have been summoned to advise for children attacked with measles and with scarlatina, I have immediately directed a nightgown to be made of flannel, and that long enough to reach quite down to the feet. Such a night-gown close in the neck, and with sleeve buttons at the wrist, gives admirable protection to the whole dermal surface, and offers no obstruction of pressure or ligation anywhere.

Children dressed in such gowns will, *cæteris paribus*, go more safely through such disorders than those that are dressed otherwise; for the danger in these maladies refers almost as much to the tendency to take cold as to the direct febrile and inflammatory provocations of the causes. And though the danger of taking cold decreases rather with the period of decline and cessation, than with those of the attack and persistence, yet it is true that no trifling ratio of the fatalities in them are chargeable to suppression of the transpiration after the danger had apparently disappeared.

Such a flannel dress as I have recommended affords not only

the most perfect and convenient defence against taking cold, but it has this other advantage, that as long as it is worn the child may be more surely kept under a treatment whether therapeutical or hygienical. The sick dress ought not to be removed, until every vestige of even the sequelæ of the malady shall have completely disappeared.

A few years since, I was in anxious attendance upon a little girl, who, as I may remember, was some three years of age. Many children of the family had undergone severe attacks of scarlatina, and she was the last one of the series to be attacked. She was an only daughter among many boys, and I was therefore the more solicitous to conduct her safely through it without accident.

I caused her deshabillé to be carefully provided—put her to bed with directions to keep her there for many days after the apparent malady should have disappeared. But as soon as she was free from the rash and the fever, I received solicitations to allow her to get up, to which I declined acceding. They were renewed the following days; whereupon, obliged to waive my rights over the case, I imprudently consented to her rising, under a promise that she should not leave the nursery. The ordinary dresses were worn, which made her the more unmanageable, as she persisted in demands to leave the apartment, so that upon being solicited again and again, I, in an evil hour of complaisance, said yes, provided she should go no further than the dining room, which was to be kept closed during her visit to that apartment. The weather became cold and damp.—A lady called; the mother walked to the front door to say something to the visitor—the young child ran to the marble step without a hat or shawl, while the friend bade farewell, and that same night I was summoned to her bedside to see her nearly dying with peripneumony, which doubtless would not have assailed my patient had she retained her flannel nightgown, and been kept in bed. The mother detests me from that hour, though I think she ought rather to mourn over her own folly in abusing the complaisance of a physician to wrest from him a reluctant assent to her imprudent and restless desires. I have mentioned this case, in which I was very blameable, as having yielded my will, not my judgment, under repeated demands of the mother, not only as illustrative of the importance of a proper dress, but as a warning against a too early abandonment of it, especially in the great exanthemes; and I have nothing to add at present upon the subject of the child's dress.

CHAPTER VIII.

CYANOSIS NEONATORUM.

I BEGIN by requesting the reader to take notice that the title of this article is cyanosis neonatorum, or the blue-disease of young children, and that I have no design herein to treat of all the affections that may in anywise serve to contravene the aëration of the blood—for all such diseases are causes of cyanosis.

There is so great a variety of maladies that interfere with the due aëration of the blood, that a volume, rather than a short article, ought to be devoted to their consideration, in any attempt to describe all of them.—Malformation of the heart and its vessels—unnatural states of the lungs, whether congenital or accidental—tumors—hydropic collections—tubercles—vomicæ—congestion—inflammation—whatsoever, in fine, prevents the due exercise of the whole function of respiration, may be set down among the possible causes of cyanosis. My intention is to treat only of those cases that are coincident with permanency, after birth, of the characteristics of the fœtal heart.

In the four great zoological classes, the mammals, birds, reptiles, and fishes, the circulation is effected chiefly by the force of a compound heart, whose economical purpose is not merely to carry on the circulation, dispensing the blood and caloric into every part of the system, but in a pre-eminent degree to convey oxygen into every part and point of the system.

In lower grades of being, as in the insects, and annelides, air is admitted to the tracheæ, through open stigmata on the surface of the body. These lower creatures require no mechanical apparatus or force, to compel the air to enter the interior recesses of the tissues. It permeates tubes that are always open to admit oxygen to the organic molecules. The higher orders of creatures could not exist without a complete machine competent to fulfil this indispensable design and purpose. Hence the birds and mammals are provided with lungs and a double heart, or rather with

two hearts, one carboniferous, or venous, and the other oxygeniferous, or arterial.

In the reptiles there are, properly speaking, three hearts, of which one is venous, or carboniferous, another oxygeniferous, and the third mixed, propelling both the oxygenated and the undecarbonized blood. In fishes, the heart is absolutely venous, consisting of an auricle receiving the blood from the whole body, which it delivers into the single ventricle; whose office it is, to inject this blood, in whole, or in part, upon the oxygenating surfaces, called branchiæ, or gills, whence it flows off to the constitution, to return by the principal dorsal vein, to the auricle; the fishes' heart, in this view, may be considered as a true pulmonic auricle and ventricle.

The child in utero, may, as to the nature of its sanguine circulation, be compared to the fish, or the batrachian. In very early stages of its embryonal life—not the very earliest—the heart consists of a double ventricle, equal to one ventricle, and of a single auricle. I say one auricle, since the auricular septum can hardly be said to exist, and the two auricular cavities are virtually one. I also said that it has a double ventricle, each of the cavities of which lends its energies to the systemic circulation. In the beginning, the pulmonary artery—which is really a ductus arteriosus—and the aorta equally concur in the production of the systemic circulation; both ventricles being required to give impulse to a circulation necessary to the rapid development of the constitution, and drive the blood to the distant capillary tufts of the placenta and back again to the heart. With the progress of the intra-uterine life, the pulmonary artery becomes developed upon the ductus arteriosus, which loses by degrees its transitive importance, and is laid wholly aside at birth as a no longer useful machinery of the circulation.

The aëration of the embryonal and fœtal blood, depending on the placenta, a machinery is required to get the oxygeniferous blood of the placental tufts out of the venous into the systemic circulation of the child, and another apparatus to turn over its venous or carboniferous blood into a part, not the whole, of the systemic circulation, which alone can transfer it to the aërating tufts of the placenta; therefore, in the child somewhat advanced in its uterine life, there is of necessity a crossing of the currents of oxygeniferous and carboniferous blood, in the right auricle,

and a direct channel of transfer from the right ventricle to the aorta.

The blood of the umbilical vein, mixed with that of the inferior cava, enters the posterior, right, lower segment of the right auricle behind the right extremity of Eustachi's valve, which conducts it across the cavity to the fossa ovalis, leading it through the foramen ovale. The current lifts Botalli's valve, which is on the left face of the septum, to pour itself out into the systemic auricle. The left ventricle receives it, and thence it is conducted by the carotids and vertebrals to the encephalon.

This is the best blood of the fœtus. It is not highly aërated; probably, not so highly as that of the Reptilia, consisting as it does of the deoxygenated blood of the portal circulation, and of that of the lower extremities and pelvis, and animated only by the slight endowment of oxygen it could acquire in the placenta, from whence it is derived by the umbilical vein.

Imperfectly aërated as it may be, it is to a certain extent, the oxygeniferous fluid of the fœtus, and is capable of developing the torpid innervations of the embryo and fœtus, which are, perhaps, far inferior in intensity to those of the chelonians and other Reptilia; doubtless, far inferior to those of many tracheal creatures and infusorials.

Having made its route to the encephalon and superior extremities, where it has given out its oxygen, the blood has become thoroughly venous, and returns to the right auricle, into which it plunges at the superior part of the sac, in front of Eustachi's valve, and opposite to the iter ad ventriculum dextrum, through which it flows, while the current from the inferior cava passes through the foramen ovale behind it, and at right angles to it.

The right ventricle is filled then with the venous blood of the head and upper extremities which it injects, by the pulmonary artery, virtually the ductus arteriosus, into the aorta, below the giving off of the carotids and subclavians. Thus it arrives again at the placenta.

In this crossing of the currents in the auricle, there is a partial mixture, but it is presumed to be only partial.

It is probable that a major part of the blood from the ductus venosus, mixed with that of the hepatic veins and inferior cava, is directed upon the head and superior extremities, though it is true that a portion of it turns over the aortic arch to be mixed

with the current from the ductus arteriosus. It is, indeed, essential that this should happen, since otherwise, the whole of the digestive, renal, and pelvic branches, as well as those of the inferior extremities, would otherwise be asphyxiated.

This admirable arrangement, by which the systole of the left ventricle propels both the arterial blood to the brain, and the venous blood to the placenta, must necessarily persist throughout the gestative life; for, should it cease previously to the birth, the fœtus would inevitably perish, while its persistence after birth, would be equally fatal.

The foramen ovale affords the sole normal route of the arterial blood from the placenta towards the brain.

Hence, the foramen ovale is persistent in the fœtus.

Hence, also, the child is born with an open foramen ovale.

But the foramen is provided with an operculum or valve.

The valve, called valve of Botalli, lies upon the left wall of the septum auricularum.

When the valve is shut, the opening is closed. The lifting of the valve re-opens the aperture.

If the valve be closed before the establishment of the respiratory life, the child dies from absence of oxygen in its brain, for the oxygen of the placenta cannot reach the brain by any other route.

The valve remains open for many days after the birth of the child, three, ten, twenty days; and it may be open seventy years in some cases.

As in the uterine life, aërated blood passes through the foramen, so in the respiratory life, carbonated blood, if any, passes through the opening, to fill the left auricle. Whenever the left auricle is filled with venous blood, it is injected by the systemic ventricle into the brain and whole system.

Such injections produce cyanosis. Cyanosis is a state of non-aëration, more or less complete and universal. Cyanosis of the capillary system of the brain, is true asphyxia.

The degree of intensity of the blue color in cyanosis, is not a certain criterion of the effect produced by the malady.

One individual may tolerate a greater degree of cyanosis than another, with less inconvenience and distress than that other individual.

I repeat that cyanosis, whether general or local, is a degree of

asphyxia of the parts exhibiting the phenomenon. Blue hands from cold weather, blue finger-nails from ague, from cholera, from drunkenness, or etherization, is asphyxia of those parts severally. Asphyxia of the capillaries of the skin, or of the extremities, is not inconsistent with life. But, asphyxia of the encephalic capillaries, when carried to a certain extent, is mortal. Mortal asphyxia is always so, because the capillaries of the brain are the seats of the malady.

This I consider to be true, because the asphyxiation of a limb by means of the tourniquet, is not suddenly mortal, it does not speedily destroy life—it only arrests development, whereas carboniferous blood in the capillaries of the brain destroys life instanter, if it be wholly and only carboniferous.

Many children at birth, or soon after delivery, discharge the blood of the right auricle into the left auricle, in consequence of asynergic or asynchronous action of the heart.

In such cases, to shut down the operculum or valve of Botalli, is to arrest the flow and cure the patient for the time being, or for all future time.

In November, 1832, the year of cholera, I had charge of the case of Mrs. Taylor, No. 503 North Fourth Street. She was about seven and a half months gone with child, when she was seized with symptoms of the prevailing epidemic. She was violently attacked, and became also affected with symptoms of premature labor, which at length led to the expulsion of the fœtus.

The child was alive, but began to turn blue under its respiration. As the cyanotic hue became more intense, the phenomena exhibited by its innervative forces, turned more and more unnatural, so that, employing only faint and imperfect aspirations, often suspended; becoming convulsed, and having feeble, scarcely perceptible pulsations, it seemed at the point of death.

The young mother, who was still ill with her cholera, could not be insensible to the danger of the child, and I perceived that the complication of a psychological with her other irritations, might render the cure of her own malady more difficult, if not impossible. It became, then, in view of the mother's position, a matter of great moment to rescue the child from an apparently imminent death. These reflections, which I made at the time, gave me great pain;—for, while I deemed the state of the child one of partial asphyxia from the mixture of its venous with its

arterial blood, the mixture being made by injection through the foramen ovale of the auricular septum, I could devise no treatment upon which to rely for obviating that injection.

I was deeply concerned, and knew not what to do; suddenly I reflected upon the structure of the fœtal heart, and the route of the fœtal circulation, and I said, if I bring the septum auricularum into a horizontal attitude, will not the blood in the left auricle press the valve of Botalli down upon the foramen ovale, and thus save the child, by compelling all the blood of the right auricle to pass by the iter ad ventriculum, and so to the lungs to be aërated?

Having practised midwifery for many years, I had on many occasions witnessed the fatal termination of cyanosis neonatorum, both in the premature and the mature child. I had seen children at five, and at five and a half, at six, and at seven months, vainly attempting to carry on respiratory life, and found them all to perish with the signs of cyanosis, whether from too large a foramen ovale, or from imperfect development of the respiratory machinery of the lungs by atelectasis.

In the case now under consideration, I placed the child, which seemed nearly dead, upon a pillow, on its right side, the head and trunk being inclined upwards about twenty or thirty degrees.

Upon placing it down in this manner, it became quiet—began to breathe more naturally; to acquire a better hue of the face, hands, and feet; until, in a very short time, it was quite well again, and did well; having no further returns of the attack of cyanosis neonati.

I shall not conceal the satisfaction I derived from the successful result of my reflections, thus put into practice in the case; for I thought, and I still think, that the child would have died inevitably, but for the treatment. In very many instances, during a long obstetric experience, I had never made such a reflection upon the means of saving the blue child, of which I had seen so many cut off. I believed, and I still believe, that I was the first to invent the treatment; and thus the first case in which I put it in practice, was eminently successful. I am not aware that any other person had before suggested it, though in his account of cyanosis, M. Gintrac gives in case 5th an account of Dr. Wm. Hunter's patient, æt. 8, who obtained relief from a paroxysm, by lying still upon his left side, which always relieved him. After

his death, the ventricular septum was found to be wanting, or rather perforated near the base of the heart, so that the aorta received the injection of the right, as well as of the left ventricle.—*Vide Gintrac*, p. 33.

Six years later, in my *Philad. Pract. of Mid.*, edit. 1838, I published some remarks on cyanosis, or blue-disease, which being written in much haste, I did not at the time remember the circumstances of the above case, which occurred in Nov. 1832, in Fourth Street above Poplar Street, No. 503, in a child of Mr. Taylor, a builder, formerly of this city.

Since the date of my first application of this method, I have had numerous occasions to put it in practice, and not a few opportunities of examining the state of the heart after death, in some of which, after vainly applying the treatment, I came to the conclusion that other causes, not patency of the foramen ovale, must exist, to contravene the curative tendency of the method.

My publications—and my explanations to friends—with the lectures on the subject that I have now delivered to many hundred students of medicine, have rendered my treatment a popular one,—to such an extent, that, in various states of the Union, the treatment is become a familiar one. Many monthly nurses have become acquainted with it, and I presume it is so divulgated throughout the land, that children suffering from the malady will very generally have the advantage of its application, if it be really advantageous, and this the more probably, since no reasonable objection could be found to the putting of it in practice.

I make these remarks, founding them upon various letters I have received from gentlemen in the different states of the Union; from conversations, and from statements made to me by medical students on their arrival here, in the autumn, of cases treated by their instructors.

This explanation will show that I am warranted to say, that my invention has become extensively known, and is to a reasonable extent understood and practised in this country; the more especially as it has been reported by many hundred medical students, that are now settled in the north, the south, the east, and the west.

I have now before me a letter from Paul F. Eve, M. D., Prof. of Surgery in the Medical College of Georgia, dated Augusta, Feb. 2, 1848. In this letter, Dr. Eve informs me that he was

in attendance 22d Nov., 1847, upon Mrs. C., then affected with premature labor of an uncertain date of gestation. The child, a male, which was born after an easy travail, weighed between five and a half and six pounds. The testes were not yet in the scrotum. The respiration was at first carried on by sighs repeated once in five minutes. The child was once supposed to be dead, and given up as lost; but by breathing into the lungs it revived, and then upon being laid upon its right side, where it was kept during four days, it perfectly recovered, and was healthy at the date of the letter. It was not dressed for three days. Every motion, for some time after its birth, would produce the cyanosis. Dr. Eve is inclined to believe it was six and a half months in the womb.

In March, 1848, I attended Mrs. G. T——, who was at the time delivered of a child at six months and ten days. It was deeply cyanosed for four days after its birth. The nurse kept it almost wholly reclined on its right side, and the infant, now about three weeks old, presents a good prospect of a successful rearing of it. In this case, the child was certainly relieved when laid upon the right side.

In the early part of the present year, I delivered Mrs. ———, Thirteenth street, of a fœtus at six months. It breathed well at first, and uttered loud cries. But cyanosis came on the third day. I many times caused the livor to disappear by turning it on the right side, and made it return by rolling the child gently over to the left side, and vice versâ, as often as I repeated the experiment. It died after some days. The foramen ovale was slightly open, and the lungs partially affected with atelectasis.

Here is another letter, dated Antrim, Allegheny County, Penn., Feb. 11, 1848, which was addressed to me by Dr. S. Schreiner, a graduate of the Jefferson Medical College.

"Mrs. A. Slatter was delivered on Tuesday, Jan. 11, 1848, at 7 P. M., of a male infant. Nothing peculiar transpired during the gestation or delivery. Parents healthy; mother quite lusty. Supposed weight of the child about eight pounds; it seemed of full age, healthy, and well to do. About 9 P. M., it seemed to have a violent attack of colic; cried violently. All attempts to pacify it were vain, until about midnight, when it became quiet, and was laid in bed behind the mother, where it remained until about 8 A. M. on Wednesday. At that time the mother awoke, and

thinking it breathed strangely, asked the nurse to take it up, to see what was the matter. She did so, and observed that it was of a dark-purple hue; the breathing seemed to cease; it was strongly convulsed, the fingers being clenched firmly against the palms of the hands."

Dr. S. informs me that the child was now removed from the lying-in chamber, in order that the mother, after she had been told it was dying, might not witness its last agonies.

"Upon remaining so for some time, it gasped for breath, the purple discoloration faded from it, and the paroxysm was over. It remained quiet, without any motion whatever for about three hours, when the fit returned again; and again it did so, each paroxysm continuing longer and increasing in intensity until Thursday (the following day), between four and five P. M., at which time I first saw it. During this time it had seventeen attacks, the duration of the last one being over forty minutes. The attacks returned at intervals of a little more than an hour.

"Its appearance, when first seen, was as follows. It laid motionless upon a pillow in the nurse's arms; pulse irritable; cheeks suffused with a scarlet flush; respiration short and quick; (it seemed as if fever was present;) dusky color of the skin, except the bright spot on the cheeks. Soon its face, then its body and limbs, became of a dark purple or nearly black color; respiration, a short gasp at long intervals, gradually increasing until it was altogether suspended for twenty minutes; pulse grew fainter and fainter, until it ceased at the wrist, and the heart only gave a heavy throb at long intervals. Gradually the pulse became (again) perceptible at the wrist—the discoloration vanished, and the paroxysm was over.

"Though the parents and all present declared there was no use in attempting anything for its relief, they consented that a trial should be made. I had it laid in the position recommended by you in your course of lectures, and in your *Phil. Prac. of Mid.*, upon the right side, at an angle of 30°, enjoining strict adherence to the position.

"From its flushed appearance, and the congestion seemingly present, I should have recommended leeches, had they been at command. I remained long enough for another paroxysm to have taken place, judging from the previous intervals, but it did not take place. During this time it attempted to cry, but made

no sound whatever, though it seemed to cry violently. After this it passed some meconium, and took a little milk and water which it sucked from a rag placed in its mouth. I was told these were the first motions of the kind it had made for twenty-four hours. They had before poured some nourishment down its throat, but it appeared to bring on a fit, and they desisted. I saw it again the next morning. It had two returns of the disease; so very slight, however, as only to be observed by the face becoming darker; but they continued only a few minutes. I should not forget to mention, that after each of these, perspiration ensued; slight attacks first, but after the second very copious.

"Pulse at this time appeared normal; respiration easy, but somewhat quick. I saw it again to-day. Has had no return of the paroxysm, and is in excellent health, with the exception of an occasional attack of colic."

I shall now offer some observations on the circulation of the blood, in order to sustain the position I have taken as to the influence of the child's attitude in curing it of an attack of cyanosis neonati; and I shall do this, not merely to defend my opinion and practice against the opposition of those who deny the utility of the precept, and the reasonableness of its doctrine, but because, while it has been, in my hands, the means of rescuing many children from death, it has also led me to entertain views of the pathology and treatment of certain disorders which I desire now to explain, hoping they may become useful to the public, and to my brethren generally.

In contemplating a living body, we are struck with the conviction of its complex nature and attributes. We behold it as consisting of various parts and organs, each endowed with powers of its own, and each charged with some especial function, the due and harmonious exercise of which by all the organs represents a state of health, while an imperfect or irregular performance of any of these offices is indicative of a condition of derangement, disorder or disease.

In contemplating such a being, in whatever grade of the zoological series it may be stationed, we are compelled to admit that of its parts, some are of more and others of less importance. It has parts that might truly be called noble, and others that are common or vile. Whether it be an annelide, or insect, a radiate, vertebrate, reptile, fish, bird or mammal, the *Ens*, the living

creature, the *Verb*—that which can do, be, or suffer, of it, is composed of the nervous mass of the creature, which is noble, and all the rest is vile, common and of less account.

To look upon the Figures at page 4 of Milne Edwards' volume on the Invertebrata, wherein he has represented the nervous system of an earwig, a grasshopper, &c., one sees the real abstract animal, deprived of all save its nervous mass, which alone is the patible, sensitive, and perceptive being, while all the rest of the constitution of it being taken away, it has thereby lost only its servitors—its prehensile, locomotive, digestive, reproductive, aërating organs. The nervous mass—the creature—the Ens, is left entire—naked—alone, in an abstract state.

This idea of a creature, abstracted from its armature, its engines and agents, is by no means a novelty, and it has the sanction of the wisest men—such as Cuvier, Lorenz Oken, and others. It is upon this idea of the creature, as consisting essentially of the nervous mass, that all modern zoological classification depends, and in fact, the whole règne animal of the illustrious French naturalist has derived the exact method and order of its arrangement from a view of the disposition of the nervous system of its integral individuals. In the higher orders of the vertebrata, the number and magnitude of the organs are greatly augmented above those of the simpler existences. A medusa, an actinia, a holothuria, or a polyp, is equally, with the most elevated mammal, composed essentially of a nervous mass, which in some without, and in others with a centrical sensorium, exists either by means of disseminated nerve points, or by a ganglionic and filamentous system of innervations.

In the human being, the nervous mass is the cerebro-spinal axis, and the sympathetic and plexual system, with all the nerve-fibres that blend their distal extremities, or reflect their fibrillæ in the substance, or on the surfaces of the tissues. The heart itself and the stomach are but portions of the nervous mass, enveloped, like the gem in geology, in the gangue of the cellular, muscular, mucous, or fibrous tela.

The same is true of the alimentary, respiratory, secretory, absorbent, sensual, and reproductive organs—of which an ultimate anatomy ought to seek to expose and make manifest solely the nervous portion of its mass.

The whole brain and cord—the pneumogastric, the trifacial,

and the phrenic nerve—all the arches of the great sympathetic—every ganglion, plexus, and fibrilla, are either conductors or generators of biotic force.

But, whether conductors or generators, it cannot be denied that they are in a degree generators, since all nervous mass is a generator.

In either case, the material vile parts which they innervate, owe, not their existence only, and their development to the nervous mass within them, but every modification of their vitality, every shade of their life modality, may be assigned to a status of the supplying and sustaining nervous mass.

In the series of creatures, rising from the lowest infusorial, we find at the summit of the scale, man with his concentrated cerebral, or cerebro-spinal nervous mass, by means of which he is rendered capable not only of impression, but of conscious perception, and of free-will; of reason and judgment, with all the powers of the intelligent mind.

It is for the conservation of this nervous Ens—this nervous mass, as Oken denominates it, that its servants and ministers the anatomical organs and histological tissues are added to it, as its endowments and properties. IT is the seat and source of their vitality. They are regulated and maintained in a co-ordinated life by ITS biotic force.

When that biotic force fails, they fail likewise; when it dies, they also perish; when it recovers its energy, they resume their powers, and perform their offices for its conservation—its protraction—its sensation—its consciousness—its free-will—its reason—judgment, imagination—its hope and its charity—its fore-thought—its retrospection—its self-complacency, and its remorse.

But what is this nervous mass?

Oken says, "The origin of the animal is from the nerves, and all anatomical systems are only free evolutions or separations from the nervous mass. The ANIMAL IS NAUGHT BUT NERVE; what it is further, or in addition, is obtained elsewhere, or is a metamorphosis of nerves." "When, also, the other systems have been formed out of the identical nervous mass, still the whole animal body is naught but nervous mass, only, in a crude or inert condition. There is, consequently, no point upon the body, on which some nervous phenomena are absolutely wanting, or where they may

not appear, under certain relations."—*Physio-philosophy*, page 330.

I shall not encumber these pages with quotations from the authorities, to fortify the assertion that the nervous mass is the essential Ens. The asseverations of a thousand philosophers would not make more or less true, a proposition which commends itself to the mind, acting upon its own perception and judgment of a dogma declared to be true. Such a truth is not proved by evidence, nor established by any method of induction. It is a truth of reason—it is a truth of consciousness—it is in the same category with the cognition of our personal identity.

Taking the dogma for granted, therefore, I shall proceed to show that the cerebro-spinal axis in man, is inert and powerless, nay, lifeless, exanimate as of itself; and that it depends upon the influence of oxygen for its power to manifest itself in its life-phenomena.

The same Oken has said that "the blood is the fluid body;" and that "the body is the fixed and rigid blood."

These expressions are equivalent to the assertion that the histological materials of the body are derived from the blood, and no one will deny the proposition. Even the nervous mass itself is developed and maintained in volume, form, and weight, by supplies from the sanguine mass; but the oxygen of the blood is the agent by which the force of nerves is brought into play. The oxygen taken up in the act of respiration, and carried into the arterial or aërated blood, is transferred to the brain by the arteries, and there its contact or immiscence with the material essence of the brain, is followed by the extrication of the power, or nerve-force. In this view, an artery is not a mere sanguiferous tube, it is an oxygeniferous tube, and it carries that principle everywhere throughout the body.

The respiratory organ, in this view, too, is but the oxygenating apparatus, though it thus produces the double effect of endowing the blood with its oxygen, and at the same time developing the animal heat, while it also eliminates a portion of the somatic carbon. The highest function of the respiration is the oxygenation of the nervous mass.

M. Cerise, in his paper, *Sur la Sur Excitation Nerveux, Mém. de l'Acad. des Sci.*, avers that to the *blood* in the *brain*, is due the extrication of the life-force, the nervous force. This doctrine is

not true, if hypothecated as of mere *blood;* since carbonated or carboniferous blood—venous blood in the capillary vessels of the brain—is incapable of effecting the least evolution of power from the nervous mass. Oxygeniferous blood is all-powerful for its extrication. Hence, since blood, merely as such, cannot generate the life-force, while aërated blood can do so with absolute perfection; we have a clear inference to the opinion that it is the oxygen which is the agent; and that, by a plain induction of facts, all of which, without exception, concur to declare that oxygen is indispensable to the exertion of a life-force, *force-vitale.*—Lebenskraft.

Nothing lives, save in the presence of oxygen. It is even true that the spiritual soul being present, all life is a result of a process of oxygenation. Hydrogen azote, chlorine, nor carbonic acid cannot evolve nor sustain life. Oxygen is the vitalizing, not the vital principle. It is the cosmic reagent for producing vitality out of nervous mass.

Mons. Le Gallois has, at page 142, the following words:—

"Life is produced by an impression of the arterial blood made upon the brain, and the medulla spinalis, or by a principle resulting from this impression." Also, "The prolongation of life depends upon the continual renewal of this impression," &c. I suggest that arterial blood is not different from venous blood, save as containing a larger quantity of oxygen, and that it is the oxygen, to which M. Le Gallois refers, and not the blood which contains it.

If it be not a mere fancy in Oken to say that the "artery is an air-tube;" and, if it be true that the blood excites in the brain the forces which, irradiating the organs through the nerves, makes manifest in them the various motions, and allows in them the impressions and perceptions that we suppose to be life; then it is conceded that modifications of the blood, as oxygeniferous, are capable of modifying the state of all the organs, and not of them only, but of all the histological integers of which the sum of a body is composed. Where the blood is healthful and normal, it will in so far as to a dependency upon the blood, produce a perfect innervation, and *vice versâ.* Supposing the blood to consist of the four constituents fibrin, discs, albumen and water, in the proportion of fibrin 3, discs 127, albumen 80, and water 790 to the 1000 grains—any change in the constituency of the blood cannot but

modify its power to take up and carry oxygen to the parts, and so to the brain.

A patient who has suffered from exhausting hemorrhage, whether traumatic or active, will, in consequence, be deprived to a certain extent of the ability to extricate the nerve-force.

If, through any faulty arrangement of the great vessels of the heart, the venous blood returning from the systemic circulation, be thrown back upon the system, without being newly exposed to the oxygenating apparatus of the lungs, the nervous mass, failing of its supply of oxygen, will fail in part, or die, according as the want is less or more incompletely supplied.

Air, that in a given number of cubic inches contains less oxygen than is required for healthful respiration, cannot be breathed without diminishing the power to extricate nervous force. Thus a traveler ascending a lofty mountain, finds his strength to be diminishing, in proportion as he rises above the sea level, and when he is at an elevation marked by 18 or 20 inches in the barometer, he finds so little oxygen in his aspiration, that he is compelled to stop, and even to sit down, after walking only a few feet—because the ordinary aspiration at 16 or 18 inches consisting say, of 20 cubic inches of rarefied air, is equivalent, in the amount of oxygen it contains, only to an aspiration, perhaps, of 6 or 8 inches at the base of the hill, where the mercury marks 31. The traveler pants for breath, which means to say that he breathes frequently, in order to get his required amount of oxygen. That amount which cannot be ingested with twenty respirations, he seeks for in forty or eighty respirations per minute, for without the requisite amount, he cannot extricate the nerve-force, nor will his muscles obey the dicta of his free-will—his volition—he is compelled to stop, to sit down, or even lie down, whereupon, consuming less of his nerve-force, he recuperates for another effort. This was the case with the party of Dessaussure on Mont Blanc.

That which happens to the traveler on the mountain summit, occurs to the anæmical girl at the sea-level. His blood cannot find sufficient oxygen in 20 inches of rarefied air; her blood will not receive it, though it be contained in the 20 inches.

But, if the blood be as perfect as possible in its constitution, or crasis—and it fail to be exposed to the oxygenating pulmonary surfaces, it can by no means excite in the brain those quantitative results as to the production of the nerve-force, that are required in

all these cases, whether of a low barometry, an anæmia, or a want of oxygen; there is failure to supply the essential reagent—the oxygen.

A copper and zinc plate, or a series of such plates, constitute no galvanic pile if plunged into milk, or olive oil. They are energized by immersion in a saline or acid solution: so, the substance of the brain, the nervous mass, has no activity when bathed in streams of carboniferous blood; it is quiescent; it is indifferent; it is aperceptive of the presence of such a fluid: but, when the oxygeniferous stream of the arterial fluid is injected into its tissues, it instantly becomes instinct with life and power under the reagent, and streams of biotic force flow off through the nerves to all the subject organs; or the free-will has power to urge the innervations to their utmost bounds of strength and precision.

An uninterrupted current of organic innervations, flows from the whole nervous mass, whether cerebro-spinal, or sympathetic. But there is a free-willing innervative force, that appertains only to the great bulbs of the spinal axis. What that free-will is, is known to God alone—it is an appurtenant and faculty of the soul, whose whole nature is unknown to us. St. Paul admits that we know not "what we shall be," when the soul shall have been disenthralled of the shackles and obstructions of the mortal body; we know not *what* we shall be, though we are conscious that we shall be. We do know, at least, that we shall be both conscious and free-willing existences. These, therefore, are qualities or faculties of the soul, exercised through the nervous mass, under the force of the great cosmic reagent, Oxygen.

From the foregoing, it appears that the presence of the arterial blood in the systemic vessels of the encephalon and spinal axis is asserted to be a requisite for the evolution of the biotic force, as far as that force proceeds from the brain and cord. It requires no further proof, after the experiments of Wilson Philip and Legallois.

I have already said that numerous explorations of the bodies of neonati have shown that the fœtal characteristics of the auricular septum are not entirely laid aside until after the third day, and often not until after the tenth and the twentieth day; and, that in some persons it remains unclosed until the latest date of advanced age. It is, however, covered by its valve.

This may show that there is no inevitable inconvenience con-

nected with persistence of the opening after birth, which is a physiological, not an accidental, nor a morbid condition; it is common to all the placental animals, and in all of them continues during a certain portion of their respiratory life.

In myriads of children, its openness is attended with no inconvenience; nor would any inconvenience result, even in the absence of the valve, provided such patency should not be followed by mixture of the venous and arterial blood, which could not happen under a co-ordinated innervation of the symmetrical halves of the heart. Gintrac, page 238, says: Toute communication entre les cavités, droites et gauches du cœur n'est pas inevitablement suivie du passage du sang noir dans les voies affectées du sang rouge; and, at page 240, he says: "The auricles first, and next the ventricles of the heart, contract at the same instant of time. If their force is equal, and the apertures through which the blood is to flow, be unobstructed, the fluid will not deviate, one way nor the other; a perfect equilibrium prevails between the sanguine columns; they oppose to each other an equal resistance, and each one follows the course naturally belonging to it."

These are undeniable facts; yet an open foramen ovale is accused as the cause of cyanosis neonati.

Is this a contradiction in terms? Let us inquire.

The heart is a machine—a hydraulic engine, provided with an auricular septum and valve, under which, during nine months of fœtal life, flows a stream of aërated blood—no one denies it. At birth, the stream, in some instances, becomes carboniferous—no one denies it. But that venous current cannot but inundate the encephalic capillaries, whence all the modifications, not only of the hue, but all the strange manifestations as to the nervous force—in the respiration—and in the muscular action, calorification, &c. &c., that we observe in cases of cyanosis.

The heart is not an asymmetrical, but it is a symmetrical organ; it has a zygo-zoar nature. In health, the two symmetrical halves of it are innervated in the same times, and with equal force or intensity.

But the synergy and the synchronousness may become asynergy and asynchronism, under circumstances of disease, or irritation, or faulty crasis or constitution, either of the organ itself, or of the nervous mass—or of the blood.

The heart is the frequent seat of convulsive innervations, or of asynergic and asynchronous action.

If the left auricle should act with greater force, or earlier, or more rapidly than the right, the blood in its cavity would press down the valve of Botalli, and cause the fluid to escape into the systemic ventricle only; but, if the right auricle should act with greater force, in earlier time, and more rapidly than the left, it is not to be denied that the carboniferous blood would in part, and perhaps chiefly, escape into the left auricle, from whence, being received into the systemic ventricle, it would hasten to deluge the brain, and the whole body indeed, with its non-oxygeniferous streams. Can any one doubt that this was the case in the young girl, cited by Gintrac from Morgagni, Epist. xvii. No. xii. It is the first case in Gintrac. A girl died at the age of about sixteen years. She had been sickly from her birth; always breathing with difficulty, on account of her extreme weakness, and always exhibiting a livid color of the skin. The heart was small, and with a rounded apex; the left had the ordinary shape of the right ventricle, while the right had the characteristic appearance of the left ventricle. But the pulmonary ventricle, although the largest, had the thickest walls. The right auricle was also twice as large, and more fleshy than the left. Betwixt these two cavities, was a foramen ovale large enough to admit the little finger. The valves of the pulmonary artery were morbid, leaving an opening not bigger than a lentil for the transmission of the blood.

In this case, the largeness of the foramen ovale may be supposed to have some relation to the constriction of the pulmonary artery, whose constriction preventing the pulmonary ventricle from readily discharging itself, equally prevented it from receiving freely the discharges from its auricle. The auricle, therefore, injected the fluid into the left auricle, and thus kept the foramen free and large, or, on the other hand, let us suppose that the foramen, being originally so large as to allow of the escape through it of most of the blood received in its cavity, there was not left a sufficient quantity to keep the orifice of the pulmonary orifice duly open. In such case, the orifice of the pulmonary vessel would inevitably diminish in size, as in Gintrac's case just mentioned.

The passage of blood to the lungs, which was not bigger than a lentil, prevented a full aëration of the blood, a fault which was greatly magnified by the rapid escape of the already carbonated

portions that could issue through Botalli's opening, without returning to the aërating surfaces in the lungs. There was faulty injection by the heart.

Such injection would lift the light valve of Botalli, whether from asynergy, or asynchronousness of the systole; and the consequence would be a state of partial asphyxia of the child, which is what is called cyanosis, morbus cæruleus, or blue-disease.

In cyanosis, an irregular, imperfect, feeble innervative force will show itself in the muscular system of the child, whether animal or organic; and sudden convulsions, lipothymia, suspended respirations, and pulsations, with blue color more or less intense and extensive, will complete the picture of the maladive condition. The child will be affected with asphyxia more or less complete. If the respiratory sources in the cerebro-spinal axis are deluged with carboniferous blood to the extent of wholly suspending the biotic extrication—death is the consequence—sudden death.

Cyanosis in this view, is asphyxia, greater or less, according to the intenseness of the cyanosis.

But, the question now recurs, as to what is asphyxia. In my opinion, asphyxia essentially considered, is black blood in the capillaries of the brain. Some physicians insist that asphyxia is black blood in the lungs. I contend that asphyxia is black blood in the brain. Asphyxia is a state of the brain in which that organ cannot extricate, or give out the life-force—the innervative force—the stream or current of nervous force—the biotic force—and I contend that it fails to do so, for want of oxygen to react upon the neurine. Cyanosis is the sign of the presence of non-oxygeniferous blood, which is dark or purple or black blood, as Bichat calls it. This purple, or dark hue of cyanosis, is caused by the presence of black blood only in the capillaries. But, when this dark hue of the cutaneous capillaries is seen, it is evidence of a similar hue of all the capillary blood, whether in the abdominal, the thoracic, or the cephalic cavities and organs. This purple state of the blood is not fatal, except it exist in the brain, whose power it suspends. If it be chased out of the brain, by oxygeniferous streams of arterial blood, all the organs and tissues that lie under the control and dominion of the nervous system, immediately recover their power. If the brain dies, they all perish in its fall. If a man die, therefore, with asphyxia, he dies because he has black blood in the brain.

A man may die from fainting, or lypothymia; and in this case he loses life, because the action of the brain is suspended. The suspension in this case, appears to me to depend upon lessened tension of the encephalic mass from the sudden withdrawal of a portion of the blood that ordinarily distends its vessels, as in sudden violent hemorrhage, in certain pathemata mentis, rapid changes of posture, &c. &c.

Asphyxia is lessened or suspended somatic innervation from privation of the oxygen-reagent. Fainting is a similar suspension from reduced tension and pressure; either may be fatal, but each requires its appropriate treatment, which is different in each case.

Asphyxia is not a status of the trunk or members; it is a status of the brain, and only of the brain.

If the vessels of the brain be injected by the carotids and vertebrals with carboniferous blood, the intellectual, perceptive, and co-ordinating and motion-giving brains cease to do their office; if new injections fill these same vessels with oxygeniferous blood which chases out the former, the powers of the brain are reinstated, provided the mischief have not already gone too far.

A man etherized, or affected with chloroform, is to a certain extent asphyxiated, besides being poisoned; the same is true of him, as of the well-digger, who descends into a well filled with carbonic acid gas. The man in the well dies, not because his glottis is closed by spasm, but because there is no oxygen to be carried to the brain. It is indifferent to him whether his glottis be shut or open, since there is nothing to enter in that can do him good or harm; he dies from want of oxygen; and it may be, that the carbonic acid, if it enter his lungs, may do some mischief there; an indifferent mischief in the greater ill.

I said that asphyxia is black blood in the brain, not in the sinuses and veins of the brain, but in the capillary part of the vascular cyst of the brain. The greater part of the whole amount of the blood, which is variously computed to be about thirty pounds, exists in the systemic part of the vascular circle. Only a small portion of it is in the venous side.

In the lungs, for example, when the pulmonary artery is a vein, and the pulmonary veins arteries, there is a great excess of the aërated, over the quantity of carboniferous blood, for not only is the capillary system full, but the venous is full. But the carbon-

iferous blood of the femorals, and of the iliacs, of the portal, and the cava, produce no asphyxia; nor is it true that in death from carbonic acid inspired in a well, the demise depends upon the presence of black blood in the trunk or members; it depends upon its presence in the brain, particularly the respiratory, oxygenating brain, whose pneumogastric branches, and all other sources of respiratory innervation are suspended and cut off indeed, because their neurine is flooded with carboniferous blood in which there is no power to extricate the biotic force—the nervous force.

If it be true that there is a valve on the left side of the auricular septum, it must be that its purpose is to prevent regurgitation of the blood from left to right.

Even in a case, when greater power of the right auricle impels a portion of the black blood through the valved orifice, any resistance offered by the valve must *tend* to diminish or prevent the transit from right to left.

If in any such case the plane of the septum auricularum be rendered horizontal, by placing the child upon its right side, the blood of the left auricle must tend to close the aperture by pressing the valve down, and keeping it down. The blood has gravitation, and its law of gravitation is as rigorous in the auricle, as it would be in a cup, or in the air. Its weight must shut the valve, if any valve exist. But, with a shut valve, all the blood of the auricle must pass to the right ventricle, and so to the lungs to be aërated. But, if the blood becomes truly aërated it is become oxygeniferous, and transferring the oxygen to the capillaries of the brain, will there excite the biotic force in a normal manner; all the irregular and diseased innervations depending upon the antecedent carboniferous quality of the blood of the encephalic capillaries must vanish before the steady innervative streams that proceed from a healthy brain, duly supplied with its quantum of oxygen.

There are many of my medical brethren who deny that my explanation of cyanosis neonati is correct, or even philosophical, contending that cyanosis is a status of the lung, or of the vessels of the heart bringing about a modality of the lung alone; while I aver that the condition of the lung, or of the trunk and members, is nothing in the category, which relates only to the state of the brain.

I am quite conscious that a man's opinion cannot determine the least of Nature's laws to operate this way or that. St. Matthew tells us, "neither shalt thou swear by thy head, because thou canst not make one hair white or black."

While, therefore, one gentleman sees only in a contracted pulmonary artery, or in a transposition of vessels, a cause of cyanosis, I am not to expect that he will come over to my way of thinking, because I think so, even had I the authority and power of the man of Pergamus, who ruled us for fifteen hundred years. I am, however, less concerned to witness the acceptation of my rationale, than the adoption of my precept. If they will turn the cyanosed neonatus upon its right side and shut down the auricular valve, I ought to be satisfied; and indeed, one distinguished author recommends the practice, while he dispraises the principle upon which it is founded.

Nevertheless, I admit that I sincerely desire to find a reasoned acceptation of my rationale; less perhaps on account of its application to the undeniable self-demonstrating instances of blue disease, than to the treatment of certain obscure, and perhaps questionable forms of the accident.

In order to explain my meaning more clearly, I shall relate a case that occurred to me a few years since, and upon which I put a construction that will not be admitted by those who oppose my rationale of cyanosis, either as to its mechanism or its real nature.

A lady had given birth to a child, apparently healthy. She was soon afterwards attacked with fever, which produced in her a series of distressing nervous symptoms. The young child, after many days, became indisposed with what seemed to be a bronchial catarrh, which was rebellious under the treatment. Dr. Bridges saw the child with me several times. It grew alarmingly ill. It was affected with a vast, troublesome collection of unexpectorated bronchial mucus, that threatened speedy suffocation by filling the air-tubes and trachea. Upon entering the apartment on one occasion, I found it in the arms of the monthly nurse, sorely oppressed and nearly insensible. It was dying; or rather I deemed it dying.

My impression from inspecting the child was, that it was moribund, and I still believe that the condition was that of the moribund, and that its life could not have been protracted beyond one or two hours, but for remedies employed to rescue it.

After observing it for some time, and noticing a livid areola about its mouth, I took it from the nurse to inspect it more closely.

The precise processes of thought by which I arrived at a conclusive opinion, have now escaped me; but I was led to imagine that the whole of the phenomena ought to be referred to a state of the brain, and not a state of the bronchial mucous membrane. I supposed that the sources of innervation becoming modified by the presence of carboniferous blood in the brain capillaries, the organs had suffered in consequence of the cessation, or irregularity, of the administrative power. Upon cutting, in a surgical operation, certain branches of the trifacial nerve, the eye becomes instantly inflamed. Dr. J. Warren says, that under etherization, the conjunctiva is often injected with blood. So, in any hinderance of the current of the pneumogastric nerve-force, the lung might also become the seat of consecutive disorder. I was convinced that the child's foramen ovale admitted its venous blood to the systemic side of the circle, thus vitiating the biotic power of the nervous mass of the child. I turned it on its right side, and kept it there. In a few moments it was relieved, and in a very short time gave no further reason for alarm, or concern of mind. In fact, the right lateral decubitus cured it.

In the month of January, 1846, I attended Mrs. Hoobly at the Indian Queen, South Fourth Street, in a confinement in which she gave birth to a healthy child.

As she was ill many days with a fever, I gave but little attention to the child. It was between two and three weeks old, when I was summoned to it by three rapidly repeated messages. I found it insensible; affected at intervals of one to two minutes with convulsions, in which the head rotated to the right in strong extension; the right arm, stiffened, was elevated as strongly as possible by spasmodic innervation of the deltoid, while the left arm also stiffened, was pointed downward and outwards. The inferior extremities were also affected with rigid spasm. The mouth was open, and could not be closed, but by force. The pulse was feeble, and the respiration low, except when troubled by the recurring spasm. Many persons surrounded the infant, which was on its back on a pillow, supported on the lap.

The child had been well but a short time before. The attack had been a sudden one.

Upon contemplating the child, which had two or three attacks of this spasm, or convulsion while I was looking on it, I reasoned with myself as to the probable cause. There was no assignable hygienic causation.

Its mouth was bluish, though not in a very marked degree.

I took the child on its pillow, and laid it on my knees, in order the better to inspect it. I said, here is a faulty innervation of the muscles of the head, neck, arms, legs, and lower jaw. Are the parts in fault, or is the brain in fault? whence these irregular intromissions of nerve-force? Is the nervous mass imperfectly oxygenated because the child sends its carboniferous blood into the left auricle, and so to the brain?

I laid it on its right side in the cradle, its trunk elevated at about 15°, and I said, leave it in this position until I return. Perhaps it will die very soon; but I have some reason to hope it may be saved, if you should not change its position. I shall be absent three hours. Do not venture to move it, until I come again. In the meantime while I remained, it changed its appearance speedily and visibly for the better; it had no return of the spasm. It fell into a calm sleep, and was perfectly well when it awoke. It required no further care.

Was this a post hoc, and not a propter hoc case? Who can say so? The treatment was reasoned beforehand, and the result looked for.

As well might it be said that every therapeutical cure by emetics, cathartics, or narcotics, or diuretics, is a post hoc, and not a propter hoc cure.

The blood in the auricle or ventricle, is not exempt from the laws of matter; it gravitates as absolutely there as in a teacup, or in the air. When I lay a child upon its right side, gravitation of the blood is inevitable; and since the valve is as delicate as the arachnoid, the smallest drop resting upon it could close, as the slightest force could open it.

I brought the plane of the septum auricularum, to be a horizontal plane; I compelled the blood of the inferior cava to rise in a vertical current to the fossa ovalis, and thus lessened the power of Eustachi's valve, to direct it upon the fossa ovalis. I shut the valve down by the weight of the superincumbent blood, and all the blood of the right auricle passed through the iter ad ventriculum, in order to be breathed upon in the lungs. It is

probable that half a dozen systoles of the heart had scarcely been effected, before the oxygeniferous streams had reached the neurine, and waking into orderly and healthful force, the before hebetized innervations of the child, all the dependent organisms and organs resumed their healthful movements and manifestations.

Nov. 20, 1847, I was called to the child of Mr. H——, in Pine Street below Eighth. This child, a female, was born in October, 1847, and was now six weeks old. Upon reaching the rendezvous, I was pained to find the infant dangerously ill with catarrho-pneumonia so far advanced, that I informed its mother it was probably too late to do it any great service.

The bronchial tubes and the trachea were oppressed with a great quantity of mucus, which so obstructed the respiration, that the child coughed at every breath, which was very short, *saccadée*, and repeated sixty or seventy times per minute. Percussion and auscultation of the chest—careful examination of the abdomen—inquiries into the rate of the pulsations, both by feeling the radial pulse, and by auscultation of the heart, led me to the painful expectation that my friends were about to suffer the loss of their daughter. I prescribed for it, under the diagnosis of a catarrho-pneumonia. Some hours afterwards I repeated my visit. It was no better.

Upon taking the child, which was on a pillow, and resting it on my knees, I found it in danger of suffocation. Every breath was a compound of coughing and crying, which I cannot describe, but which every physician has observed. Upon inspecting it, I observed a livid areola of the mouth. The feet were bluish, as well as the finger-nails. It is true that such blueness might depend, and did in part depend, on the saburral state of the pulmonary mucous membrane—smeared as it was with mucus, and the tubes partly filled up. As the attack had been sudden—too sudden to be conformable to the normal march of such maladies, I reflected that the fault might not be primary in the respiratory mucous membrane, or pulmonary texture, but in the brain, which had lost its power of maintaining the status sanitatis in the lungs. I deposited the infant on its side, as for the treatment of cyanosis neonati. It seems to me that the valve of Botalli fell down upon the foramen ovale, and that the carotid and vertebral injections of the brain immediately began to be thoroughly oxygeniferous. The administrative nervous mass

commenced anew its government of its provinces, and, in a short time, the symptoms of the disease had vanished; I found in the morning of Nov. 21st, that no further treatment was necessary. I cured the broncho-pneumonia by shutting Botalli's valve, just as I should cure a conjunctivitis, by restoring the integrity of the trifacial branch cut off in a surgical operation on the face, and the loss of whose innervative current might have determined the conjunctival inflammation.

The objectors do not deny that the fœtal circulation, up to the first act of respiration, is through the foramen ovale, and the arterious duct, and that it is so indispensably, and only because the operculum is raised. They cannot deny that the aperture virtually exists after birth, even for many days—nay, in some, during a long lifetime.

To deny that the two zygo-zoar halves of the heart may act asymmetrically and asynchronously, is to deny an admitted truth. To deny the effect of such dissidence in time and force, appears to me to be but a mere denial.

I had many years ago charge of the health of a young woman, who labored under frequent attacks of cyanosis. She was often threatened with sudden death. In the intervals she appeared to be in good health, earning her bread by the needle.

One day while much indisposed, she sat up in bed eating a dinner of codfish. She suddenly fell on her side dead, in her 28th year. I found a foramen ovale, into which I could put a swan-quill.

In the heart of the Archduke Joseph, the cyanosis had coincided all his life long with an open foramen ovale.—See *Gintrac*, p. 228.

If in my own heart there be an aperture as large as the end of my finger, it is indifferent to me in respect of my health, while the two auricles contract symmetrically. But if asymmetrically, then I am liable to sudden illness, or even sudden death. My patient probably flooded her medulla oblongata with carboniferous blood, and ceased to breathe in consequence of the annihilation of biotic force evolved from the medulla.

How often have we seen similar states of the system brought about in attacks of puerperal eclampsia?

In this disease, an impetuous sanguine circulation gives rise to unmeasured, I had almost said, explosive evolutions of biotic

force. In eclampsia, the spasm and convulsion of the whole system, and particularly of the diaphragm, which often makes aspirations of only three or four cubic inches of air, allow the carboniferous streams to overflow the encephalon. Under this want of aëration, the face gathers blackness apace—the protruded tongue is of a deep purple, and a true asphyxia intervenes between the life and the death of the patient; so that the sooner the blackness of the features and tongue comes to assure us of the arrest of the cerebral excitation, the sooner is the patient to be extricated from her perilous predicament.

If the medulla oblongata be overwhelmed, she dies; sometimes this is the case, and she dies outright, no trace of lesion being discoverable in the brain.

Here we have no good and reliable resources of medication, save those that serve most rapidly and powerfully to diminish the momentum of the sanguine circulation in the encephalon, of which venesection is to be before all others preferred.

A proper venesection, executed before the asphyxia is established, in general prevents that consummation by substituting a state of deliquium for the otherwise inevitable asphyxia of the eclampsic paroxysm, a far less dangerous and more speedy way of escape. Less dangerous, since the sanguine engorgements and retardations coincident with the cyanosed state of the brain in eclampsia, expose the sufferer to inconvenient effusions or extravasation.

As to the right lateral decubitus for the new-born child in cyanosis, no doubt rests on my mind, after multiplied experience since 1832, now sixteen years. I am not embarrassed by finding the treatment sometimes unsuccessful, because, when it is so, I can with confidence believe that failure to change in blood is effected through some other agency than that of an open and used foramen ovale.

In the son of Mr. A. B——, I detected the existence of cyanosis neonati, and relieved the child, but could not cure it by my method. A series of diseased innervations bringing the whole constitution into ill-health, continued to manifest themselves, notwithstanding all the precautions I could devise, and I announced, long before the death of the infant, which lived for several months, in addition to a patent foramen ovale, the exist-

ence of an aperture in the septum ventriculorum, which was verified by the examination of its heart after its decease.

In a similar manner I announced in Mr. J. B——'s child, an open foramen ovale, as the cause of convulsive attacks which led at last to an effusion within the encephalon with separation of the sutures, and evident fluctuation, which was verified necroscopically.

Professor Wood will bear me witness of the sudden and marked and indubitable relief and cure of Mr. H. W——'s infant, apparently dying with cyanosis, when it was placed in position.

In the eldest son of Mr. S. B——, jun., the respirations were but four to the minute; the pulse was gone, and the child within two or three minutes of its death, nay, deemed by some to have breathed its last. The recovery was almost instant.

The same is true of Mr. H. K——'s son, with the exception that the case was not so extreme; so also of Mr. Rich's child, Mr. J. W——'s, and many others.

I beg leave to refer again to the letter from Prof. Eve, at p. 98, reciting a case of cyanosis treated by him. A letter from Dr. Casey, of Hartford, Conn., informs me of a violent case successfully treated by the position. Dr. Hains of this city, and many others, have succeeded in like manner.

I can by no means adopt the views as to the essential nature of the malady, set forth in Prof. Wood's late work on the Practice of Physic. That author, like others, appears to me to have mistaken the symptom, to wit, the *blue color* for the disease, which, as I have so often said, is essentially a failure of innervation from absence of oxygen in the brain. He doubts the causation as dependent on the mixture of the two kinds of blood in the heart.

I cannot understand that the leg or arm should suddenly die for want of oxygeniferous blood; and I cannot perceive how the constitution can live, if the nervous mass, which is the essential Ens, be dead, or inert, as it certainly is when only the decarbonized blood of the veins circulates in its capillary vessels. M. Gintrac himself, who originally made four kinds or species of cyanosis—of which the first consists of the *mélange du sang noir, et du sang rouge*, and the second a coloration *bleue également constituée par ce mélange*—comes to the true conclusion at last, that, instead of four species, there is but one, although he calls that one two.

I deny not that a constriction of the pulmonary artery may pro-

duce cyanosis. Whatever restricts the action of the venous heart, must do so. Great collections of fluid in the thorax produce it. Pressure upon the heart from dropsy of the pericardium; extensive injuries of the lungs from tubercular degeneration; suppurations, and large vomicæ; cynanche trachealis, or pseudo-membranous laryngitis; pneumothorax; atelectasis pulmonum; a host, indeed, of accidents and diseases that ruin or disable the respiratory machinery, may produce cyanosis. But of these I have not spoken. I confine my proposition to the persistent use of the foramen ovale after birth, a use in which the blood of the veins takes the course originally followed by that of the placenta.

There is no other treatment for cyanosis neonati than that I have suggested; at least, there is no other reasonable treatment. Venesection, emetics, purgatives, diuretics, soporifics, baths, counter-irritants, cannot cure it.

When cyanosis has introduced epiphenomenal affections, they may be treated. These affections will be found to relate chiefly to a state of the pulmonary circulation and excretions.

In some instances I have applied a large leech or two to the region of the heart, in order haply, to assist in overcoming the pulmonary or cardiac engorgement, so apt to coincide with failure or disorder of the biotic power of the medulla oblongata. In general, however, when the malady has depended on the injection through Botalli's foramen, I have been content to place the infant in the proper position, and trust to that alone for the cure.

CHAPTER IX.

RESPIRATORY DISORDERS.

The disorders of the respiration are among the most fatal of those that attack young children.

Independently of the primary affections of the respiratory organs, there are many examples to be met with, in which other maladies, having originally no direct relation to a condition of the

aërating apparatus, come at length to trouble the course of its functions, and cut short an existence, which but for such intervention might have been readily secured against the tendencies of the principal attack. In scarlet fever, for example, a major part of the fatalities are referable, not to the lesions of tissues, or the exhaustion of nervous force from intense irritation—but to the obturating and occluding effects of swellings, and viscous secretions and plastic exudations on the air passages, which, agreeably to my clinical experience, are the causes of death in by far the greater proportion of those who succumb after the first three days of scarlatina.

There is little occasion for surprise at the dangerous nature of the maladies that contravene the respiratory office, since whatever hinders, by diminishing or preventing, the due oxygenation of the tissues, and especially of the nervous mass, constitutes a direct attack upon the very principle of existence.

Having already, in my observations upon cyanosis neonati, spoken at some length on the subject of the respiration, I might perhaps avoid the accusation of "*iteration*" by going at once to the task of describing the phenomena of the respiratory disorders, and pointing out the course of the treatment that I deem most appropriate for each individual form or variety of such affections.

But there is little need for renewed description. Descriptions the most accurate and elaborate abound in the medical library, and I should not now take the trouble to write with the sole and superfluous view of painting the visible and cognoscible phenomena of diseases familiarly known. It is better not to write, than to write merely in repetition of what authors, better qualified, have already done in this line. And it is only in the hope of presenting certain views of some of the pathogenic and pathological principles that ought to lie at the very foundation of our therapeutical intentions, that I shall indulge my inclination to speak, perhaps iteratively, upon the subject of the disorders of respiration.

The importance of this function is so great, and its performance so indispensable, that there is no living creature unendowed with some means of effecting it. The lowest medusa or holothuria has its air-sac. The tiniest insect has its trachea; the fishes have branchiæ or gills; and the reptiles, birds, and vertebrates are provided with lungs, by means of which to aërate their juices, their solid substance, and their blood.

The quantity of air consumed in the aërating process has some relation, or bears some ratio, to the intensity of the life of the subject. It is impossible that life can exist or be made manifest in full perfection, where let or hinderance is interposed betwixt the body and the oxygen that aërates it and the fluids of it.

There is no other access of oxygen to the interior of the body, than that through the blood in the lungs—for, it is useless to impute as such the oxygen ingested in drinks or in food.

The oxygen is admitted by the nostrils. The mouth also sometimes admits the atmospheric air in persons who from any cause fail to breathe by the natural respiratory apertures, the nostrils; for of men it has been said truly, "whose breath is in their nostrils." The access may be restrained, or cut off by diseases of the mouth and nostrils.

The breath passes into the lungs by the larynx, trachea, and bronchi; whatever comes to obstruct or close these passages, hinders or prevents the access of air to the lungs.

The bronchi terminate in what are called air-cells, which are the termini of the bronchi.—They constitute the essential respiratory organs; but they are accompanied by capillary branches of the pulmonary artery, or capillary radicles of the pulmonary veins—as well as by similar branches and radicles of the branchial artery and vein. They are also enveloped in nerve filaments; and their absorptions take place by lymphatic absorbents. All these materials are encompassed and enveloped in a gangue of cellular tela. It is evident, therefore, that diseased action in the pulmonary artery or vein extending to the capillary system of these vessels, or similar states of the branchial vessels, or of the nerves, or absorbents, or cellular tissue of the lungs, may, to a certain extent, interfere with, or wholly prevent, the due exercise of the function of the lung. For example, if the pulmonary artery should yield to the lateral pressure of the blood, and if the capillary branches of that artery should also yield, and allow too great a quantity of blood to reach the lungs, rendering it in this sense plethoric, or hyperæmic, we shall find some derangement of the health as a consequence.

The same may be said as to the branchial artery. If, too, the recrementitial absorbing apparatus loses its power, we shall find the results of that failure in the state of the respiration; and if the nerves do not transmit the nerve-force in due intensity, neither

too much nor too little, disease becomes evident. Lastly, if the halitus of the tela-cellulosa be not withdrawn, but be allowed to accumulate, we shall have œdema pulmonum, with all the epiphenomena arising from the presence, and pressure of serum, in the cellular membrane.

Again, the blood is a variable element of the body. Its crasis is ever changing with the ingestion and digestion of food, with the progress of the secretions, and excretions, and exhalations; with exercise and rest, with hunger and thirst; and with satiety.

The crasis of the blood is not the same in any two consecutive moments, and the modifications of the crasis so far as dependent upon the aqueous proportion of it, are to be held as modifying its power to undergo the process called aëration. That is to say, a thin, watery or anæmical state of the fluid admits of a lesser pro rata aëration of it than a rich, valid or plethoric condition.

Further, the blood is modified not only by the augmentation or diminution of its aqueous portions, but also by the quality and nature of its solid parts. The discs are less perfect or the fibrin and albumen more or less abundant in a ratio to the quantity of the discs in some than in other specimens.

It is clear that modifications of the condition of the blood may and do exert a pathogenical influence, as either laying the foundation of disease in the organs and organism, or as promoting and favoring diseased action already begun or established by other causes or elsewhere.

Finally, the source of all vital power is in the nervous mass—whether the cord or its bulbs, the great sympathetic or the plexuses, or the nervous tractus, wherever situated. But if the source of power fail, the organs that are sustained, and that are vitalized by means of its irradiation, will fail likewise. Hence many diseases are the direct results of failure in the nervous mass, at the sources of irradiation, or of the nervous tractus rendered incapable of transmitting the power. Thus passions of the mind may determine the attacks of asthma. Irritations of the stomach from prava ingesta may in like manner irritate the brain to pain, or delirium, to asthmatic paroxysms, or spasmodic laryngitis, or laryngismus. The division of a nerve in the face may be instantly followed by conjunctivitis. The pressure of the emerging cusps of a molar tooth may excite the cerebellum, and end in the most explosive extrication of nervous force, manifested by epileptiform

convulsion in the teething infant. It is needless to cite examples which are innumerable.

In any case of respiratory disease affecting a young child, the physician will find himself dependent upon his own powers of discrimination as to the diagnosis, since the sufferer cannot make any verbal relation of the seat, cause, kind, or degree of his sufferings. The elements of our opinion exist in the rate and effects of the respiratory office. Its rate consists in the number of its aspirations taken in a given time; in their completeness or incompleteness; in their facility or difficulty; in their apparent ease or painfulness; in the employment in them of the accessory muscles or not; in the heat of the body, resulting from them; in the color or tint of the general surface, and of the visible mucous surfaces; in the sounds that accompany them, whether heard at a distance or by auscultation, and in percussion. Much useful and most precise information may be acquired, by attending to the decubitus and gestures of the child; to its cries, its cough, its physiognomical expression, its cutaneous transpiration; and to its power of ingestion, as well as its appetite.

It is not necessary merely to breathe; there must be *just so much breathing*, neither more nor less. The body must be oxygenized. If too highly, there is evolved an excitation to be characterized as plus; if insufficiently, the excitation will be characterized as minus; neither of these is consistent with real health or complacency, or agreeable sensations.

In the machinery of the respiration, the thorax or the body may be compared to the cylinder, and the diaphragm to the piston of an engine, which works at full, or half, or quarter strokes; and which makes a greater or less number of revolutions in a given time.

I have seen the diaphragm contracting more than 200 times a minute in an hysterical female, for considerable time together. The reader has his own diaphragm so far under the control of his will as to be able voluntarily to make it contract at such rate, for a short time together; but even a very short experiment suffices to convince him it cannot be done without exposing him to pectoral, or pulmonic, as well as encephalic sensations, that are anything but agreeable, and the continuance of which but for a short time, would be found by no means safe.

There are various estimates of the quantity of air inhaled at

each ordinary aspiration. It is unnecessary to be exact in the proportions. If it be computed that a man of ordinary size breathes 18 times per minute, and aspires 18 cubic inches of air, at each breathing, he will use 466,560 cubic inches of air per day, or 324 per minute.

Four hundred and sixty-six thousand five hundred and sixty inches, are what he requires to oxygenate his nervous mass and his whole system, whether of fluid or solid elements, during twenty-four hours. To what a condition of evil health is he reduced, who instead of this amount, can appropriate only three-fourths, or one-half of the required quantity! What efforts doth he make to effect the acquisition by redoubling or quadrupling the number of respirations, calling to his aid all the voluntary accessory muscles of aspiration, and exhausting the nervous mass by unintermitted drafts upon it for the biotic force with which it alone can innervate the respiratory engine and machinery! The consumption of nervous force is here rapid and exhausting to the last degree; and the direst spectacles of human woe are to be observed in certain persons affected with dyspnœa from hydrothorax, or croup, or other suffocative disorders.

I repeat, to what a condition is man reduced whenever a small per-centage of the oxygen is withheld! Even a small portion being cut off distresses, a large portion procures for him agonizing sensations of suffocation, and when a still larger suppression occurs, it delivers him over to an inevitable death.

It could not be otherwise if the doctrine be true, that the contact and mutual reaction of oxygen and the nervous mass is the antecedent or cause of the biotic force, or innervative force. Respiratory disorders that diminish or hinder this essential reaction, are assaults upon the very founts of animal life, and the hinderance is not only to the organ that is the seat of the disorder, obstruction, or inability, but it tends to overthrow directly all the other functions of organs, by depriving them directly of a part of their requisite supplies of nervous force from the fountain head in the cord or its bulbs, or in the great sympathetic system.

Inasmuch as I have in a former part of this volume, (p. 58,) expressed the opinion, that certain young children do perish from a respiratory want occasioned by coryza, or other obstruction of the nasal passages, I shall not recur here to a consideration of that accident.

It is said that persons occasionally perish from mere spasm of the larynx.

The word croup, in its most general acceptation, is expressive of a supposed spasm of the larynx, wherefore it is called spasmodic laryngitis, and from the peculiar sound of the voice, stridulous laryngitis, Millar's and Wichmann's asthma. In this case, it has been observed that spasm, affecting a muscle of the glottis, the arytenoideus transversus, may close the aperture, and cut off the access of air to the respiratory surfaces in the air-cells, the oxygenating surfaces. But a state of inflammation of the larynx is asserted in the very term *laryngitis*, to accompany this spasm, for the termination of the word in *itis* is employed to express the idea of inflammation. Perhaps it may be strictly true that, even in the simplest forms of the affection, called spasmodic croup, there exists a degree of inflammation of some portion of the laryngeal structures, which serves to modify the action of the glottis in the respiration. In a perfectly healthy individual, the glottis always gapes in the act of aspiration, as shown by Dr. Wilson Philip in his experiments upon rabbits at pages 32, 33, in which he shows also that the motions of the glottis depend upon the eighth pair, whose section always puts an end to its motions. It is not to be doubted then, that while the glottis must be very liable to spasm, under whatever states of irritation, it is also liable to a paralytic, or hyponeuric condition in other states of the nerve power, whether as depending upon changes in the vagus, or in the parts of the brain from whence the vagus derives its origin; and whether as affecting the muscular, the mucous, or the cellular textures that enter into the composition of this organ.

It is quite true that in spasmodic croup, or spasmodic laryngitis, it often happens that although the patient may have been very suddenly attacked, and almost as suddenly relieved, he is notwithstanding left, for some time after the relief, affected with signs of an altered condition of the windpipe; that is to say, he will be a little hoarse; and upon any attempts at rapid, or sudden aspiration, he will find that the croup sound is still there; as is the case also in the act of coughing, and this, though in any ordinary rate of breathing, not the least sign of difficulty can be perceived.

This seems to me to show, that what is called spasmodic croup, is not merely spasm, but that there is a substratum of

congestive or inflammatory disorder, which ought not to be lost sight of by the medical attendant. To look upon it as merely spasmodic, and thus wholly contradistinguished from the graver forms called pseudomembranous laryngitis, is to make a serious mistake, as diminishing the apprehension of danger, which in fact, is not gone as soon as the spasm of the larynx has been removed by the therapeutic influence of a nauseant, an emetic, or both.

Experience, indeed, shows that an attack of the malady that makes its first appearance, say at 11 P. M. during the first sleep, and which is apparently vanquished by a dose of ipecac., is very likely to be repeated on the following night. My opportunities for observation have deeply impressed upon me the opinion that, in a majority of attacks, there is a recurrence of the phenomena, some time in the next succeeding night, which I deem confirmatory of the notion, that there is always in these cases a real inflammatory condition of the parts of the windpipe. It appears to me highly improbable that we should so commonly witness this occurrence, were the malady eclampsic or nervous merely.

The public in general are well aware of the dangerous nature of the affections of the windpipe; and an attack of croup is therefore sure to rouse the apprehensions of parents, who make, however, no distinction of diseases, all suffocative affections of the larynx being included together under that dreaded name.

In this confounding together of two very different maladies, the public commit a great error, since the diseases have different courses, intensity, and tendencies.

In simple spasmodic laryngitis, or ordinary croup, there is often not the least reason to suppose the child sick until the moment of explosion of the attack; an attack which in many examples is more violent in the first moment of its existence than in any subsequent time. In these instances, a child is put to bed under usual circumstances, falls asleep, sleeps tranquilly for an hour or more, and then in an instant, in a manner truly eclampsic, it starts from its repose in the most violent agitation and fright, suffocated, coughing, and giving out the peculiar laryngeal sound called crouping, and causing the attendants to fear an immediate suffocation, so difficult and laborious is the respiration. The face becomes excessively flushed; the head, neck and hands are bedewed with a sweat of agony; the pulse becomes hurried, and in a short time the heat of the body is considerably augmented.

Amidst cries, and fits of coughing, and choking, the patient gradually becomes appeased; and when the diaphragm recommences its gentle and normal acts of aspiration, the air is found to pass into the trachea arteria with very little, or perhaps with no sound. But upon any renewal of the coughing, or of the cries, the spasm of the larynx is set again on foot, and the patient must pass through another paroxysm. A very similar state of things is to be observed in the paroxysms of an ordinary pertussis.

In all these phenomena, I can discover naught else than affections of the laryngeal branches of the pneumogastric nerve, whose sensitive cords being brought under a maladive influence, it calls into sympathetic disease the motor or spinal accessory cord, that must be supposed to run pari passû with the former.

I have often noticed a condition in which an action the inverse of this takes place. I allude to the effects of violent exercise upon the throat, in boys after a long race. For example, I have seen boys who have determined to run a mile, obliged to stop by the coming on of a spasmodic stricture of the larynx, which not only admonished them that the effort had already gone too far, but compelled them to stop the career; the larynx perhaps refusing any longer to gape, at each aspiration, because the motor branches of the eighth pair presiding over that office had become exhausted of innervative force. The runner, upon sitting down, in general finds that the suffocative sensation soon disappears; yet it ordinarily happens that a decided hoarseness follows the effort and continues for many hours. In this case, the motor cords, or spinal accessory, being exhausted, the sensitive or pneumogastric cords are sympathetically distressed, and allow of the engorgement, inflammation or submucous infiltration that would constitute the pathological condition introduced by the race.

The same thing occurs to the public speaker. A public discourse, lecture or harangue, may go on for an hour without modifying the two vocal powers of the larynx, whose moving parts are normally actuated by the will transmitted through the spinal accessory branches. But, as soon as the exercise is over, it is found that the sensitive cords have allowed the texture to assume that state which produces hoarseness, and a feeling of soreness or sensibility of the throat; and in many persons, the frequent repetition of these acts lays the foundation of what is called preachers' cough, or parson's cough.

These views lead us to inquire, whether or no the cases of spasmodic croup are not sometimes purely nervous affections, or disorders arising from modifications of the state of the respiratory brain, and acting upon the windpipe—and not affections of the windpipe disturbing the action of the respiratory brain.

I have already very fully expressed my belief as to the predominance of qualitative states of the nervous mass, in developing and maintaining the forms of diseased action, and little doubt rests upon my mind, as to the primary and predominant qualitativeness of the nervous mass in the croupal diseases, denominated thymous-asthma, Kopp's asthma, laryngismus, laryngismus stridulosus, &c. &c.

In the ordinary cases of sudden croup, or common croup, the agitation of the muscular system, and of the respiratory muscles at the onset, amounts virtually to spasm. In Kopp's asthma or laryngismus, real spasm not unfrequently attends, nay, it comes synchronously with, the laryngeous attack.

I have witnessed, however, very numerous specimens of quite young children affected with laryngismus or croupal respiration, occurring occasionally, and being repeated daily and even many times a day for months in succession, in whom no other sign of the least disorder could be discovered, and which finally ceased to appear. In such cases, the children have grown and prospered, as well as if not the least suspicion of doubtful health had arisen concerning them.

As I have made these observations many times, during a great many years, I cannot doubt that the experienced reader of these pages will recall similar instances to his own memory, and that he will perceive the class of cases to which I here refer.

In such cases I have not interfered, save to observe them carefully, and to use precautions of a hygienical sort. I have had the opportunity to observe a good many cases of true laryngismus stridulosus, some of them fatal ones; but I have seen by far a greater number of samples, in which infants, especially in the month, had merely the laryngismus or crowing sound, which, as above stated, has at length wholly disappeared, leaving no maladive traces behind.

The malady called holding the breath, so often observed in young children, is a case of this kind produced psychologically. The spirit or temper of a man is often as capable of becoming

pathogenic, as his solids, or his fluids. Holding the breath is one of the samples of these psychological diseases. But, to return.

I regard laryngeal spasm as essentially connected with some, to me unknown, pathological condition of the medulla oblongata. When the malady has proceeded to the extent of bringing on convulsions, I have presumed an extension of the pathological state from the medulla to the cerebellum, a case in which the greatest danger menaces the life of the child. Some of those who have perished, have succumbed to fatal extensions of the pathological lesions to the cerebrum, marked by symptoms of real hydrencephalus, while others have died instantly, as if by a sudden suppression of the forces appertaining to the respiratory bulb of the brain.

The true croup, or plastic croup, pseudomembranous laryngitis, a form in which plastic exudation from the mucous membrane comes to choke and fill up the canal of the windpipe, is, perhaps, the most dangerous form of the maladies that were formerly grouped under the name of croup. I regard it as more dangerous than laryngismus stridulosus, or Kopp's asthma—for the reasons above set forth. But I desire not to be understood as expressing the opinion that it is more dangerous than Kopp's asthma, when that is attended with convulsion, for, in such extreme violence of the disorder, the cerebellum, and sometimes the hemispheres, are greatly involved in disease.

True croup does not in general attack suddenly. It is ushered in by hoarseness and with slight cough; there is some feverishness—and a depression of the spirits which is very marked. The muffled tone of the voice goes so far as to become a whisper—so that even in slight attempts to cough, and in crying, the sounds uttered are whispered sounds.

This state of things may be observed for one or more days, until at length, in a fit of crying or coughing, the peculiar crouping is heard undeniably.

As a general rule, it will be found that the posterior parts of the palate, the arches and the tonsils are now flecked with clots or patches of lymph-exudation, which, it is to be presumed, also extend into the glottis and whole canal of the larynx—descending along the aspera arteria into the bronchi. Such diphtheritic inflammation, if not arrested, tends to fill the tube with exudation corpuscles, which, adhering to the superficies producing them, at

length fill up the tube so completely as to cut off the access of air to the respiratory cells. As soon as the obstruction has reached such a grade as to prevent a supply of oxygen sufficient to carry on life with due vigor, the patient begins to succumb—to sink—and at length to die.

I have now enumerated the different forms of laryngeal disease, that have formerly been interchangeably called croup—videl. spasmodic laryngitis—laryngismus stridulosus, and pseudo-membranous laryngitis—of which the latter alone is deserving to be called true inflammation of the organ—though in the first named case there is reason to suspect the presence of engorgement at least, and also, perhaps, a slight inflammation of the mucous membrane, as I remarked in a former page.

I have met with one case, in a child about two years old, in which violent respiratory distress was observed, upon every attempt to swallow. There was no tonsillitis, but I discovered that the posterior wall of the pharynx was thrust forwards, and supposing it to be lifted by a purulent collection behind the mucous membrane, I punctured it, and let out a considerable quantity of pus, whereupon the child was relieved.

Two samples of a similar purulent deposit behind the pharynx, have, within my knowledge, proved fatal to adults by occluding the glottis.

The case is doubtless a rare one,—which moves me to record it here. In all those samples of inexplicable difficulty of breathing we meet with, it is well to remember that they may possibly arise from such disorder of the pharynx.

In the spasmodic croup, whose assault and ordinary progress I have already described, I have rarely found it necessary to resort to venesection in the treatment.

When a child has suddenly started from its repose in the manner described, it is usual to get the feet as soon as possible into a warm bath, which should be rendered warmer by the frequent addition of portions of hot water—so that the pediluvium may be continued until the heat of the bath becomes nearly intolerable. I think that the temperature at first should be about 92° or 94°, and that the bath should last about ten or twelve minutes, during which the heat should be raised to 104° or 106°. I find that a gradual increase of heat renders more complete and more durable the revulsive activity of the process, and that a greater quantity

of blood continues to flow to the extremities, and for a longer time than when the water, being at first very warm, is allowed to cool as the bathing goes on.

While the bathing is taking place, a portion of ipecacuanha in powder, say twenty grains, should be mixed with four dessert-spoonfuls of water, one of which may be given for the dose—to be repeated every ten minutes until relief is obtained.

I have observed a great many children, in spasmodic croup, to be completely relieved by the first spoonful, which in the mean time excited no perceptible nausea, nor exerted any other influence save to relax the spasmodic affection of the glottis. Upon finding so complete a relief, I have desisted from any further administration of the remedy. The child has fallen asleep, and had no return of the symptoms.

In cases when so fortunate an operation of the remedy did not take place, I have repeated the doses until full vomiting has occurred; and thereupon have generally had the pleasure to observe a cessation, or at least a great diminution of the spasm and other evidences of irritation of the glottis. The vomitings here are generally of the last ingesta that have become intensely acid, together with a considerable quantity of viscid mucus of the stomach, showing that organ to have been the seat of an acid and mucous saburra, which may, doubtless, have as much to do in developing the pathogenic train, as the exposure to cold and damp that are so generally accused as causes. The relief thus obtained by an oppressed stomach, I doubt not, has a great influence in restoring the whole pneumogastric nerve and its branches to a more normal condition of evolutive and transmissive power, thus freeing the subject tissues of the larynx from their dangerous predicament.

It is a curious circumstance, and one calculated perhaps to show how large a part is taken in this malady by the pneumogastric nerves, that emetics often fail to excite vomiting, though administered in large doses. This appears to be generally admitted; and the physician, in order to meet the emergency, frequently finds himself becoming apprehensive as to the audacity of his practice; for large doses of ipecacuanha, of antimonial wine, of tartar of antimony and potash, of hive syrup, are found to require many repetitions before the stomach becomes sickened. The doses are in some examples urged to an extent so dangerous, that one might

well tremble for the consequences, especially when tartar emetic is used. The apology for these dangerous exhibitions is, that the stomach sympathizes with the throat to such a degree, as to render it insensible to the power of ordinary doses. But what sympathy is that which should make the stomach insensible to even alarming doses of tartar emetics, save a sympathy of all the branches having a common origin from the spinal accessory and vagus in the medulla oblongata? Does not this sympathy lead to the inference that much of the pathological condition of the larynx is due to a qualitative state of the medulla oblongata itself, disabling it from effecting fully, or equably, the innervation of the organs subject to its normal control? Croupal attacks are nearly as apt to follow prava ingesta as exposure to the air, and if so, then the physician will find a clearer indication for the use of emetics, which he will no longer give to the end solely that they may promote the secretion and expuition of laryngeal mucus, and bring about a favorable *detente* of the circulation there, but that they may rid the stomach of noxious saburra, which is not unlikely to lie at the very foundation of the attack, being the absolute pathogenic cause of all the symptoms, first disturbing the brain, and thence the subject tissues.

Be this as it may, it is certain that the action of vomiting, as well as the sensitive condition called nausea, has great power, not only to check the force of the heart's systole and relax the capillary resistance to the systemic injection, but to augment the mucous excretion of the fauces, the larynx and bronchi, all of which is eminently curative in the case. After the operation, the spasm is either much lessened, or wholly removed, and the infant usually falls asleep bathed with copious perspiration.

I was taught, so far back as 1812, to make use of alum as an emetic for those cases in which the stomach refuses the influence of moderate doses of ipecac., antimonial wine, or tartar emetic, and I have for thirty-six years accustomed myself to rely upon it as the most certain, prompt, and, at the same time, safe emetic for croups and catarrhs.

It is several years now since I published a recommendation of the alum emetic, in the *Medical Examiner*, for which I drew up an article on Croup, and I now with great confidence renew and repeat the encomiums I then pronounced upon the medicine.

Many times have I seen very alarming illness brought on in

young children by tartar emetic, but I cannot remember a single sample of any inconvenient result of the exhibition of alum powder.

To a child under a year or two years of age, it is quite safe to exhibit a teaspoonful of powdered alum, mixed with a similar quantity of honey. Such a dose may be safely repeated in from ten to twenty minutes, though it is very rare to find an instance in which vomiting is not produced within five minutes of the time of exhibition. Children vomiting by this medicine, appear to me to recover very soon from the nausea, and without any signs of that exhaustion or relaxation that follows a vomiting provoked by antimonial wine, or emetic tartar.

Generally speaking, the dose is productive not only of the ejection of a great deal of gastric mucus, but, likewise, of a vast expuition of faucial mucus, which cannot but tend to relieve inflammatory turgescence and engorgement of the larynx proper, whose mucous crypts and glandules participate in the therapeutical influences of the direct contact of alum with the fauces and pharynx.

The article on Croup, in a Treatise on Diseases of Children, by Dr. J. F. Meigs, 8vo. 1848, contains so full an account of his experience with the use of alum, much of which is coincident with my own, that I prefer to refer the reader to that work, rather than extend these remarks any farther in this place; my design being not to write out a full account of diseases of children,—but to make some notices and observations of certain of them only.

It appears to me that the indication here, is nothing more than to observe with studious care, the progress of the disorder, and, upon finding it receding, to do nothing that might in the least interrupt the exercise of the favorable tendencies. But if, after the bath and the emetic, the skin should be warm, and the pulse full and frequent, a vein ought to be opened in order to take away a quantity of blood sufficient to bring about the proper relaxation of the circulatory force.

I cannot conceive of the reasoning that should induce a physician to trust a crouping child with a bounding pulse, to the therapeutic conservatism of any method whatever, save that of the lancet. The bounding leaping artery at the wrist, is but the exponent of the state of branches of the carotids and vertebrals in

the brain; and surely if there be a pathogenic power beneath the sun, it is that of a rapid, intense circulation in the encephalic capillaries. Such a circulation not only evolves the biotic power enormously, which is felt by the pathological tissue already in danger, but spreads far and wide the fire of inflammation, and causes the malady to hasten to the conclusion of its processes. It seems to me that one of the rare events in a medical practitioner's career, ought to be the losing of a patient with simple spasmodic croup—yet certainly many are lost, perhaps, from want of early intervention in their behalf.

I think it highly dangerous to regard all cases of simple spasmodic croup as fit to be entrusted to the curative powers of drugs alone. I cheerfully admit that vast numbers of the cases yield readily to a treatment without venesection. I advocate the precept to remember, always, that the lancet affords the surest guarantee of success and safety.

There is apparently a growing distaste for the practice of venesection, which, whether it be derived from a change in the epidemic constitution of the air, or from the existence of a greater wisdom in the existing race of physicians, seems to me apt to mislead in certain kinds of cases.

Pseudomembranous laryngitis, or plastic croup, is certainly acute inflammation of the laryngeal mucous membrane, and it is an inflammation so intense, that it gives early rise to the plastic exudation which composes the false membrane. This inflammation is, in my opinion, often a purely local disorder—indeed, one might think it so in most of the cases, should reference be had to the manifest state of the general health in the commencement. My own recollections of cases impress me with the opinion that these most fatal attacks are to the last degree insidious, that they steal slowly and unsuspected upon the victim, exhibiting themselves under the mask of a slight hoarseness which is disregarded, as being at most only a common cold. The child in the meantime appears to have neither anorexia nor fever; it preserves its complacency, and even its gayety, until of a sudden an alarm is taken upon hearing the croupal sound, in some act of crying or coughing. This is the signal that assistance is required, and the physician is invited to attend.

Even now the flecks of exudation in the fauces are not always

to be found, and the fever is either not yet formed, or it is very slight.

This state of constitutional disturbance is too apt to mislead. It is this state that attracts the regards of the practitioner, and it is upon it that he grounds his therapeutical intention.

The disturbance is too slight to put him in fear for the constitution, and he abandons it to its own tendencies, turning his mind to the contemplation of the pathological state of the air-passages.

If, instead of finding only a slight degree of fever coincident with the crouping voice, he should discover a bounding pulse, a pulse to be characterized as a *synochus fortis* pulse, he would hardly refrain from bleeding the patient to incipient deliquium. Unfortunately, he rests his intention upon a supposed SLIGHT augmentation of the force of the arterial pulse. He decides that the pulse does not call for the lancet, and he substitutes for it the emetic, the nauseant, the bath, the topical application, and the aplastic force of calomel. Under such a treatment, the disease of the mucous membrane of the larynx makes steady progress, and when the plastic exudation comes to obstruct the aspirations to a degree sufficient to cut off a certain per centage of the aëration of the blood in the lungs, a new and commonly fatal train of general innervations has begun its march over the prostrate powers of the organs.

It would be better practice to bleed the patient *ad deliquium* in all cases of recent origin, and showing evidences of inflammatory action in the larynx, in addition to the spasmodic state that is clearly shown to exist whenever the crouping is heard.

Under these impressions as to our therapeutical duty in such cases, I cannot lay aside my regret for the growing distaste for venesection of which I spoke a little while ago—for, whether this distaste depends upon an alteration of the epidemic constitution, upon fashion, or upon motives relative to the vulgar sentiment growing out of the reign of a great medical heterodoxy, I remain fully convinced that these laryngeal inflammations are rarely to be safely conducted, except by means of venesection, carried to a great extent.

The power of the lancet over the force of the arterial circulation, cannot be denied; and it is of that power of reduction that we should avail ourselves under these circumstances. It is true that we have a similar, but far less effective force in the antimo-

nials, baths, and calomel. Timidity, a proneness to yield to the prejudices of the unlearned, and a mistaken reliance upon the indications derived from the arterial pulse, are apt to induce us to rest our hopes of cure upon the powers of drugs, which the statistical reports inform us are not really dependable resources.

It is probable that the pathological condition in pseudomembranous laryngitis, consists not only in a vitiated state of activity in the muciparous glandules and follicles of the air-tube, but in a real phlogosis of the corpus mucosum, and its submucous tissue. The exudation-corpuscles issue from the inflamed corpus mucosum, and take the place of the epithelium, which is destroyed. At the same time that the tube is filling with the exudation, it becomes smeared with viscous mucus, and muco-purulent excretions. The submucous cellular membrane becomes also infiltrated and tumid, so that the ingress of air to the lungs is obstructed, not only by the exudation, but by the viscous mucus, and by the submucous swelling; to which should be added as another element of the obturation, a positive thickening or engorgement of the corpus mucosum itself.

It is extremely improbable that for all these pathological accidents, an emetic, a nauseant, a bath, a topical application to the thorax, or some doses of calomel could prove reliable remedies; and it is highly probable that a bold and prompt venesection, one that should weaken the power of the arterial injection very positively, one sufficient to keep it down, when once reduced—such a bleeding, followed by the emetics, the nauseants, &c. &c., would rescue a greater proportion of the children, than are now saved by the medical ministry.

As to the use of leeches applied to the region of the larynx and trachea, I venture to remark that there are few cases in which the system can tolerate the abstraction of blood by them, in which it could not as safely admit of a direct depletion by the lancet. A venesection is, indeed, a more manageable remedy. In bleeding, we may put an instant stop to the jet; we can suspend the flow, while we consider whether we shall let the flow recommence, and in the meanwhile we can make our inquiries as to the therapeutical good or evil of the operation thus far. By venesection, we may, in a good degree control, not the force of the circulation only, the development force—but, in controlling it, we may in a

measure dictate as to the degree of the innervative force of the whole nervous mass.

I look upon the uses of leeches as secondary—those of venesection as primary; the topical abstractions of blood are most efficacious when they follow, not when they precede, or take the place of general bleeding.

With these views, I conclude that, in the management of croupal diseases, in which there seems to be any, or the least tendency to plastic exudation, our chief reliance should be upon venesection, carried to the extent of incipient deliquium animi.

The amount of disease we have to contend with is trifling; perhaps two superficial inches of mucous tissue comprise the entire sum of diseased texture; but that superficies, once filled with plastic exudation, destroys the patient by cutting off the sources of oxygen of the blood. It has, therefore, all the pressing importance of the most furious pleurisy, or the most foudroyant apoplexy.

If the patient in pleurisy ought to be bled to save his life, or if a physician would open both the temporal arteries, or both the basilic veins, for an apoplectic, I see not why he should not exhibit as impetuous an energy to snatch the threatened victim of croup from an imminent death by asphyxia.

There is little doubt as to the beneficent influence of calomel in these circumstances. The dose should be a full one, in order that a decided impression should be made by it upon the nervous system, upon which its force is that of a sedative; for, not less powerful in sedation than tartar emetic, is a full dose of calomel. Hence its aplastic property as a medicine. Whatever reduces the threshing power of the heart—whatever serves to allow the first and second acts to follow each other gently and slowly, is aplastic—whatever serves to diminish the vital tension and the functional exertion of the endangium, is aplastic; venesection is first in such power, and perhaps tartar of antimony and potash, or calomel, second.

The bath is admirable for the same end.

It is useful to apply warm fomentations or poultices to the throat.

It is also expedient to unload the alimentary passages by means of an enema; and after the calomel, by means of castor oil, which I prefer, as the speediest and most reliable aperient or purgative.

After the emesis—after the venesection—after the calomel, the fomentations and baths—an excellent medicine may be administered, that is called Coxe's hive syrup. Indeed, for more than thirty years past, Dr. Coxe's hive syrup has been a standard drug in the management of the various forms of croup in Philadelphia. Its composition, squills senega and tartar emetic, renders it a most prompt emetic; and in a great majority of the cases, it has been used as the emetic here. But, as a mere nauseant and expectorant, the consumption of the article has been, and is still, very great. When given in small doses of five to twenty drops, repeated with intervals of an hour, it appears to act very successfully in the direction above named.

There can scarcely be met in the wide circle of medical observation, a spectacle of sorer distress than that exhibited by a child during the gradual progress of its suffocation, under an attack of pseudomembranous laryngitis. I refer here to that period of agony that is observed while the patient yet preserves his sensibility, and while the strength is not very greatly reduced, a state that enables him to perceive the sensation of approaching asphyxia, and to struggle in vain for breath, which cannot be breathed through the rapidly closing windpipe.

This profound misery is lessened towards the close of the case; for, when the non-aëration has reached a certain point, a state of anæsthesia is found to come on, in which the victim lies calm and indifferent, sleeping his life away, without agony or effort.

The state of the nervous mass is here not dissimilar from that which is superinduced by the use of chloroform and ether, when pushed to the anæsthetic extent; and I have reason to believe that dissection or surgical operations, done for an individual under such circumstances, give as little pain as when performed under the influence of the letheon itself. But, in the middle stages of fatal croup, the jactitation, the struggle for breath, and the physiognomical expression of anguish, are so great, that the spectacle is sometimes truly appalling.

Happily for suffering humanity, there is a power in surgery to which we may appeal, in cases that would remain otherwise hopeless. I allude to the operation of Tracheotomy, or opening the windpipe, in order to let the air down into the lungs, when the larynx has become too much filled with false membrane to admit of its entrance in sufficient volume to aërate the blood in the lungs.

This operation has been performed with success a great many times, particularly in Paris. The success is estimated by Messrs. Trousseau and Valleix to equal fifty per cent. of the cases in which it has been employed.

Inasmuch as the incision would never be resorted to, but in instances wholly incurable by natural or by therapeutical methods, the saving of one-half of the otherwise inevitably mortal cases should be deemed a great encouragement to the adoption of the resource.

So far as I can learn, the operation of Tracheotomy in croup, has been performed four times only in Philadelphia, and in three of them the patients were not rescued, while in one the cure was complete, as well as rapid, and without any notable inconvenience.

I believe that the failures here had served to dishearten our physicians and surgeons, and for a long time past no attempts have been made to rescue the dying victim by means of the bistoury.

A recent success in the use of Tracheotomy, as an ultima ratio in croup, has been so gratifying to all the persons interested in the case, as to convince me that the profession ought more frequently to adopt it, under the circumstances proper for it—that is to say, in all cases where after a clear, undeniable diagnosis of pseudo-membranous laryngitis, the accumulation of false membrane has choked the air-passages to an extent that must soon prove fatal, unless relieved by means of a surgical operation.

There is but little danger that any surgeon will be found over hasty in the adoption of this course, for there are too many objections arising out of the state of feelings, whether in the friends of the patient, or in the attending physicians themselves, to render it probable a too early resort will ever be had to the bistoury.

I shall now state a case of the operation, which will better show what motives there are to operate, than any mere argument that I could put down upon paper.

George Repplier, an only son, aged four years, was a healthy child, being robust and fat.

On or about the 20th of May, he was affected with a hoarseness and a cough. His voice became whispering, and his cough gave out the croup sound.

A Homœopath was called, and gave him, probably, decillionths

or some equivalent—nothing. On Wednesday, 31st, and Thursday, June 1st, his respiration was laborious, and his voice a whisper; the croup being much aggravated. On Friday he was very ill. On Saturday, 3d, his state was most alarming, until near dark, when the Homœopath was dismissed, and I was sent for. Being absent from home, my son Dr. J. F. Meigs was called, and found the child affected with all the symptoms of pseudomembranous laryngitis, in the last stages of its progress.

Hopeless as Dr. Meigs was of being able to render any effectual aid to the perishing boy, he felt obliged to try some remedy, and with a faint hope that it might restrain the rapidity of the inflammatory processes still going on in the diphtheritic surfaces of the larynx, he applied a few leeches to that region. I reached the house just as the leeches were come off.

The boy was tossing from side to side, flinging his arms abroad in his distress. His face was of a modena red; his lips bluish; his gums and palate white; his pulse excessively rapid and small, and the respiration effected by long protracted efforts of the diaphragm, during which, the air in small quantities was drawn into the chest, and expelled as slowly, and seemingly with as much difficulty, as was experienced in its inhalation. My idea of it was that the calibre of the tube was not one-eighth of an inch in diameter, and that the boy must die before morning, for I thought that such enormous efforts to breathe might alone suffice to consume the small remainder of nervous-force left by many days of membranous croup.

I could not, upon the most careful auscultation of the thorax, discover the least respiratory murmur in either lung, for the reduction of the calibre of the larynx was so great, that the small quantity of air that permeated the lungs, gave out no audible murmur in the bronchi.

I explained to the father of the child my opinion as to the very precarious state of the boy, and both Dr. Meigs and I agreed in opinion that he was lost without remedy.

Nevertheless, we mixed half an ounce of powdered alum with four spoonfuls of honey, and gave him one-fourth of it for a dose.

We were surprised that the first dose did not cause him to vomit. In a few minutes, a second, a third, and then a fourth, which was the last portion, half an ounce in all, being taken, full vomiting

came on, with the ejection of large quantities of viscid mucus from the stomach, followed by a great expuition of faucial mucus.

The operation of the emetic was very complete, and, as observable in the use of this article, was not followed by any appearance of greater weakness, or exhaustion, but rather by a slight mitigation of the distress. Some counter-irritant applications were then made to the neck, and he took calomel in five grain doses, which were repeated in the course of the night, Dr. M. watching with the patient. He took in all nine doses, making forty-five grains. The night was most distressing. In the morning, all the symptoms being aggravated, and the anæsthesia of cyanosis, or asphyxia, being considerably advanced, we informed the father of the child that we entertained no further hope for the patient, save such as was attached to the Tracheotomy operation, which we urgently recommended. Both parents accepted our proposition, and Professor Pancoast being called as surgeon, that able operator conducted the case in the manner described in the following letter to me.

My Dear Sir:—I send, in accordance with your request, a brief account of the operation of Tracheotomy, which I was suddenly called by you and Dr. J. Forsyth Meigs to perform on the 4th inst. We found the little patient in such imminent danger of suffocation, and the parents so urgent for the employment of any promising means of relief, that we were enabled at once to proceed with the operation as follows.

The child was laid on a table garnished with a folded blanket and pillow, with his head facing the window, and sustained by yourself, your son, the father of the boy, and my student, Mr. Horner. I first divided the integument and fasciæ, exactly in the median line, from the lower part of the cricoid cartilage, to the top of the sternum. The inner edges of the sterno-hyoid muscles were thus exposed. Those muscles were separated, with some of the tissue below them, with the handle of the knife, and with a few touches of the edge, especially at the lower part of the wound, after it had been ascertained with the finger that there was no middle thyroid artery sent up from the innominata.

A large vein was found at the bottom of the wound, crossing obliquely to the right side, which I tied and pushed aside. The isthmus of the thyroid gland was now exposed. No pulsating vessel being felt in this part, I divided it, with the intention

of taking up the cut vessels on either side with the tenaculum, separately or in mass, in case there was bleeding, which did not, however, follow. The trachea, covered with its cellular sheath, was now freely exposed for about an inch and a half. This sheath I next split up longitudinally, and cross-cut near the larynx, so that I could push it readily aside, and leave the trachea well exposed, without risk of the sheath forming a nidus for the lodgment of blood or mucus, and presenting subsequently a physical obstruction at the opening to be made in the trachea. I now with the bistoury, opened the trachea in the middle, dividing the fifth, fourth, and third rings. This incision was instantly followed by a spout of mucus and flakes of false membrane, with decided relief to the patient. Pausing, with the lips of the orifice held lightly apart, until these convulsive efforts had in a measure subsided, I raised in succession, with the tenaculum, the margins of the tracheal incision, and removed with the scissors a semi-elliptical piece on either side, so as to form an oval orifice, about three-eighths of an inch long, and one-sixth, or a little more, broad. The lungs and trachea were now speedily relieved through this opening, of a good deal of mucus and false membrane, though a regular layer of false membrane, covering the back part of the trachea, could still be seen through the orifice. A leaden wire, about one-eighth of an inch in diameter, chosen for its non-elasticity, was brought round from the back part of the neck, and the ends bent to a little more than a right angle, so as to take a deep hold near the surface of the windpipe, and draw the sterno-hyoid muscles and all their coverings apart, leaving a clear gaping wound in the neck, with so much free space above the new tracheal orifice, that it was not likely to be drawn up under the integuments and obstructed, in gulping or deglutition. The leaden wire was then moulded on the neck, so as to rest smoothly and easily, without liability to displacement. Thus placed, it fulfilled its office well; for the patient, you will recollect, could turn about in the bed, and run round the floor, with little inconvenience from it. My intention in resorting to the excision of a piece of the trachea, and leaving a defined opening, rather than the usual incision of the rings, with insertion of a tube, arose from the difficulty which attends the discharge of the tenacious mucus and membrane through a curved tube, and the keeping of it clear for respiration, as well as from a desire to avoid the

irritation which the presence of a foreign body must more or less excite. In this instance we were successful in getting a new breathing orifice, larger than the rima glottidis, admitting of easy respiration, and enabling us to remove with the forceps such flakes of false membrane as were too large to be coughed or blown out. The size of the orifice was besides luckily proportioned; for, as it was allowed to close up gradually and spontaneously by granulation in front of it, by the time it became shut the ventricles had become cleared of the false membrane, and the respiration took place regularly and easily by the natural channel, without any evident impairment of the voice. Now twenty-one days after the operation, the wound in the neck is solidly cicatrized, and the patient is gone into the country to spend the summer. I remain very truly, Yours,

J. Pancoast.

To C. D. Meigs, M. D.

June 25th, 1848.

As soon as the incision was made, the air rushed into the trachea, and was followed by a noisy explosion of cough, which drove out through the aperture a great quantity of mucus, mixed with ingurgitated blood, amidst which were portions of false membrane, which, being seized by Dr. Pancoast with the dressing forceps, were drawn away.

Less than half a minute was passed amidst the agitation of the first fit of coughing, upon the cessation of which, the child appeared to be perfectly easy—indeed, his breathing, which had for so many days been beyond measure laborious, suddenly became perfectly easy, and the transition from a state of suffocation and imminent death to one of perfect ease, was so rapid and complete that the father supposed his son to be just dying.

Dr. Pancoast, with admirable judgment, now resolved to remove the elliptical disc from the trachea, in order to make a good and sufficient aperture, and not to be under the necessity of using the metallic tube. He observed that the metallic tube, worn in the trachea, could not but contravene, in some degree, any curative tendencies that might follow the operation; and there is much reason to attribute the subsequent most rapid cure to this prudential and ingenious method of proceeding.

The following part of the day, Sunday, June 3d, was passed

in perfect tranquillity by the little patient. Mr. Horner, or Mr. Hewson, both of them private pupils of Dr. Pancoast, remained near the child day and night, in order to remove by the sponge, or the dressing forceps, any portions of plastic membrane or mucus that might come to the opening; and also that they might keep the wound carefully open, by freeing it from dried blood or mucus that should form troublesome incrustations around the orifice. A considerable quantity of the pseudo-membranous deposit was successfully withdrawn by those gentlemen.

To the great care and watchfulness exercised by Messrs. Horner and Hewson, much of the subsequent success, and the total absence of inconvenience, is fairly to be attributed. I saw the boy on the 19th of June, playing in the street; the wound is closed completely, and he has no remaining indisposition, save a slight occasional cough, which may perhaps depend upon a remaining tenderness of the mucous surface of the trachea, at the point from which the disc was exscinded. In June, 1850, he was in good health, and his voice is perfectly restored.

To read Dr. Pancoast's account of the operation ought to convince any one that such incisions, dissections, and ligation might give very great pain to a person possessing his ordinary sensibility; but the little boy was perfectly tranquil during the whole operation, making no complaints, and, in my opinion, not perceiving much pain, in consequence of the anæsthetic state of his sensitive nerves, produced by the very advanced asphyxia, from which this skillful operation rescued him.

The pleasing result of Dr. Pancoast's operation, in this case, led to the performance of tracheotomy on the two children of Dr. Roper, dentist of this city. In one of the children, the operation failed, and in the other was successful. The failure is justly attributable to the extension of the plastic exudation into very small branches of the bronchi. The tubes of lymph were removed after the death of the child, and being still preserved as an anatomical preparation, exhibit the proofs of what I have above stated as the cause of failure, to wit: it shows that the disorder was not confined to the larynx, but was a disease extensively affecting the bronchial tubes. The aperture made by the surgeon into the trachea could by no means admit a sufficient volume of air into the pulmonary cells, since even the small ramifications of the tracheal branches were choked by the exudation.

I have recently been the witness of an operation of tracheotomy for pseudo-membranous croup, in another case, which proved fatal. In that case, it is true that the exudation had affected the ramifications of the trachea very far down the tubes; yet I remain inclined to think the case might have had a happier termination but for a most profuse hemorrhage that arose during the operation from the division of a very large vein. This hemorrhage brought on a nearly fatal swoon, during which it is probable that a heart-clot was formed; for the post-mortem inspection revealed a very firm white fibrinous clot in the pulmonary auricle and ventricle, the processes of which filled and extended far onwards in the course of the pulmonary artery. It may be the child could not have recovered from the pseudo-membranous angina. I feel sure it could never survive such a heart-clot. The case, therefore, is one of an unsatisfactory character, as an item in the statistics of the operation—its value being vitiated by the occurrence of the swoon, and the consequent coagulation of the blood in the heart. It appears to me that, in all cases of tracheotomy, it might be possible to preserve the patient from the danger of hemorrhage by a careful dissection: the transverse branch, that is most liable to be cut, can be secured by two ligatures, the vein to be divided betwixt them; while the middle vein may be thrust to the right-hand side with the handle of a scalpel as the rings of the trachea are being exposed.

It is a distressing duty, that of recommending or performing a tracheotomy operation, and the painfulness of these duties is greatly enhanced by the absolute uncertainty as to success. I hold that we are not, and can never be in any case, competent to decide, *à priori*, upon the extent of tracheal surface that is affected by the exudation. Yet where all other hope fails, I should consider myself obliged to state the possible advantages to be derived from opening the trachea. The only danger attending that operation is that from the chance of hemorrhage, which, it seems probable, could always be avoided by ligation of the veins.

The operation is scarcely painful.

To support this assertion, it seems to me necessary only to say that the sensibilities have nearly disappeared at the period when the tracheotomy should be deemed advisable. In the case of Mr. Repplier's son, I know that the nervous sensibility of the child had become so low as to be fit to be called a really anæsthetic

state of it. Very large and cautious dissection was made without drawing from the child the least expression of suffering: and in the other case, no struggle, nor the least resistance on the part of the little patient, gave me reason to suppose that the surgeon was giving great pain.

To be nearly dead from asphyxia is to be anæsthetized, as truly as if from chloroform or ether. If I am correct in these impressions, and I confide in the careful observations on which these impressions are founded, then I may say that a great objection to the tracheotomy disappears, at least from my own mind, since I might, in the extreme illness of a child, or other, feel unwilling to inflict a pang by doing an act that I would cheerfully do provided it might be done without pain.

As to the time for performing the operation, I do not suppose that any rule can be laid down, fit to govern in all cases. The case itself must make its own rule. A competent physician and surgeon is alone able to decide upon the emergency. He will perceive whether any reasonable hope remains of a recovery through merely therapeutical influences, and his decision should be final. I have heard it objected that the operation may be done unnecessarily. I admit that such cases might occur, yet I find no solid objection on that account, because I look upon the operation as nearly painless, and scarcely more dangerous than the drawing of a molar tooth, excepting always the risk of hemorrhage, which, as before said, can be successfully guarded against.

It appears to me that, in a case of pseudo-membranous croup—one in which the larynx is much choked up with exudation, and also obstructed with great quantities of viscous mucus, always found in conjunction with the false membrane—there is but little reason to hope for a recovery while the aëration of the blood is momentarily becoming less and less perfect from the progressive diminution of the current of air through the closing larynx. The nervous mass is rapidly losing its power to keep the organs alive by irradiating them, through the nerves, with the motor and sensor powers. The patient grows sensibly and rapidly *weaker*, thus cutting off our hopes of any recovery. The want is oxygenation. If in such a case we could by any means maintain the oxygenation of the blood, the nervous mass might therein find the power to cure the real malady of the larynx. Let us therefore accept the only possible mode of pouring the oxygen into the blood, by

giving a new inlet to that element through the front of the trachea, by cutting out an elliptical segment of sufficient size.

An objection is sometimes urged on account of the so-called ataxic nature of the malady—diphtheritic croup. I cannot regard the case as a case of ataxic disease. It is truly one of great feebleness, but that feebleness depends on the absence of the oxygen, and the failure, through its absence, of the innervative force, and not upon any ontological principle or essence of the malady. In the real ataxic diseases, there are alterations of the crasis of the nervous mass—they are essentially diseases of the neurine; but asphyxia is merely a negative proposition—it is black blood in the capillaries of the brain. If we take away the black blood by substituting abundant injections of oxygenized blood into the brain capillaries, the ataxic character disappears. Thus, in the case of young Repplier, the ataxy, so called, was extreme—he was dying; but, as soon as Dr. Pancoast allowed the oxygen of the atmosphere to come into contact with his blood, he was cured. In a very few hours, he could run about the chamber, which was so shortly before likely to contain only his dead body. He could have got up to walk within the first hour.

As a means, therefore, of enabling the nervous mass to perceive and respond to our therapeutical impressions, I should prefer to open the trachea, in the just and reasonable expectation that the calomel—if you will—with senega; or the nitrate of silver, might have occasion better to display their curative forces in an economy capable to receive and prompt to respond to their sanative impressions, rather than in a perishing and therefore insensible and aperceptive mass of matter, half dead already, and everywhere, within the range of its failing nervous force. There is little ground of reasonable hope to cure any malady wherein the functional powers are drooping or dead through failure of the centro-peripheric influences, that assuredly cannot be maintained save by the proper reaction of oxygen on the neurine of the nervous mass.

I cannot but think, from what I have observed in consultations, and from what I have myself felt, that medical men often take a most erroneous view of the character of this malady. For example, in any case where the supply of oxygen is measurably cut off, we perceive signs of great debility, and we are too apt to be misled as to this so-called debility so as to employ or reject methods of

which we should have quite a different appreciation but for our misapprehension.

There can be no examples more illustrative of my meaning here, than such as may be cited from the cases of cyanosis neonatorum, relieved by turning the child on to its right side. In some of these instances, the infant passes in a few minutes from the last degree of weakness to a state of active, perfect strength. The weakness vanishes before the renewed oxygenation of the neurine of the nervous mass consequent on the shutting down of Botalli's valve and the immediately following exposure of the blood to the air in the lungs. I think that the error consists in our usually confounding the ideas *inability* and *debility* in our cases. The inability is extreme in croup, but may be recovered from, as in George Repplier, in a few minutes. From a state of real debility, however, one can recover only by gentle gradations, not suddenly. A patient exhausted by fever, or by hemorrhage; or one weakened by famine, cannot become strong again in a moment; whereas, a child in croup, and nigh unto death from the laryngeal obturation, *might* have rosy cheeks within a few hours after a good aperture made in the trachea. I conceive that a medical man would very naturally find his reluctance to operate greatly increased by any opinion of his of the extreme *debility* of the child; whereas, he would feel less of such reluctance should he regard the state of things as characteristic not of real debility but only of inability in the patient.

I should, in any case of pseudo-membranous laryngitis, advanced so far as to leave no reasonable expectation of the recovery under therapeutical treatment, probably feel obliged to resort to the aid of the surgeon, and I should so determine upon a general view of the case; not suffering myself to be guided by any results of auscultation of the thorax, which, if confided in, ought perhaps to deter one from the operation.

Auscultation of the thorax is of little use here for purposes of diagnosis. In all cases of great restriction of the tracheal openings, the sounds of the lungs cannot be heard; at least, my own experience teaches me that the respiratory sounds lessen, *pari passù*, with the increase of the membranous deposit on the walls of the larynx, and at last wholly disappear. I am of the opinion, that greater confidence may be reposed in the results of percussion than on those of auscultation, while neither the one nor the other

can have the least power to disclose to us the extent to which the pseudo-membranous exudation may have lined the trachea or the branching tubes of it.

The statistical returns of the tracheotomy operations in France serve to confirm me in my views as to the propriety of resorting to it in all suitable cases.

I have not been inattentive to the argument against the operation derived from certain unlooked-for recoveries without that resort, and I have myself witnessed the restoration of more than one patient, so far advanced in the asphyxia of pseudo-membranous croup as to have livid hands and feet and cyanosed features during several consecutive days. Such recoveries are, however, rare in the history of the malady; and I am not, I hope, wrong in supposing that even these instances, above referred to, would have been more wisely treated, and perhaps more humanely, had an earlier recovery of aërating power been allowed by admitting the atmospheric air into the lungs by an elliptical opening as used by Dr. Pancoast.

I shall close these remarks on croupal disorders by a concise recapitulation:—

1. Diseases that diminish or hinder the ingress and egress of the respired air through the larynx and trachea destroy the patient by asphyxiating the blood. In proportion as the blood becomes less and less aërated, the nervous force is evolved with less intensity, and the power of the organs and tissues fails in the same proportion.

2. Spasmodic affections of the muscular organs of the larynx, though less dangerous than the exudative obstructions, are yet worthy of the most careful attention, since they may readily lead to exudative disease in the mucous tissue of the organ of voice and the trachea.

3. The exudation corpuscles that constitute the plastic deposits in pseudo-membranous croup are deposited on the surface in consequence of the extreme activity of the inflammation existing there, and not in consequence solely of a state of the whole health or a state of the blood as a whole. Hence, flecks of lymph, or exudation spots, fixed upon the arches, the tonsils, or pharynx, ought not to be regarded as signs of a depravation of the mass of the blood, or of a dangerous ataxy of the constitution, but only as evidences of an intense activity of the circulation and innerva-

tion of the parts affected.—It is true that this activity of the circulation increases the risk from the local disorder.

4. Inasmuch as a slight diminution of the aperture by which the air reaches the lungs leads to exhausting frequency or force of respiration, in order that the requisite amount of oxygen may be imparted to the blood, and as the lessening of the supply strikes at the root of the functions by cutting off the sources of the innervations, the patient will be probably lost unless the local inflammation and the constitutional excitement, if any, be counteracted by antiphlogistic treatment.

5. In resolving upon an antiphlogistic treatment, it is safer to be governed by considerations of date, and of exigency, as to the degree and prospects of the aëration, than by a state of the pulse, color, temperature, and sensibility.

6. To take blood after the pseudo-membranous deposit is already abundantly formed would be useless. The obstruction has in that stage become physical, and cannot be removed by antiphlogistic remedies; and the loss of blood could not be relied upon as a remedy for the deposit already formed.

7. Yet, if in a case of croup it should be found, upon due examination, that the tonsils and arches, as well as the pharynx, are affected with plastic deposit, and if the altered sounds of the voice, together with difficulty of breathing, might lead to the opinion that the deposit of exudation corpuscles had not already gone too far—it would be safe to assume that a venesection carried to incipient deliquium might check or even cure the inflammation of the trachea, and thus put an end to the further extension of the exudative processes. It would be much more probable that a patient thus treated should escape from death than one entrusted to the curative power of drugs alone. I have met with instances of the malady in which the child has discharged portions of tube and obtained relief thereby, and such examples are well known to occur.

Now, the expulsion of the tubular pseudo-membrane could only occur in cases wherein the process of depositing it, the inflammation, had come to its close, and when the tissues, acquiring a healthier grade of action, had either suppurated, or discharged behind the layer of membrane a thinner material of exudation, or even a natural sort of mucus.

Nothing is so likely, as I conceive, to bring about this desirable

conclusion, as a well-conducted venesection. Hence I should not, in all cases, feel that I was acting imprudently to let blood for the patient, though I were at the same time sure of the existence of the pseudo-membranous lining.

On the other hand, should the dyspnœa and the cyanosis, and the state of the general circulation lead me to no hopeful conclusions of the kind above stated, I should not venture to recommend a resort to the lancet.

It will always be for me a grievous reflection, that in a case of pseudo-membranous croup, the malady will not admit of an appeal to the lancet—and that, because I feel convinced that the drugging practice, whether with emetics or expectorants, or mercury, can hold out only the faintest prospects of a recovery. There is no time in these rapidly destroying maladies to bring about such states of the constitution by means of drugs as are required to remove the local disorder. Therefore, when I perceive the impossibility of a hopeful resort to the lancet, my reliance on the medical art, for the cure of the patient, is at once struck down.

CHAPTER X.

WHOOPING-COUGH.

The violent and protracted disorder called whooping-cough frequently leads to the destruction of the young child; and even when, after great suffering, the health of the patient is at length restored, so much anxiety has usually attended the course of the malady, that it ought to be regarded as eminently deserving of careful study by the practitioner.

Whooping-cough, or chin-cough, technically denominated pertussis, is characterized by recurring paroxysms of coughing, in which the patient makes a long, protracted inspiration, during which the lungs become quite filled with air, which is soon driven out, not by a single explosive cough or act of expiration,

but by a succession of expirations, continued until all the air that can be pressed forth is completely driven from the lungs.

In making the diagnosis of this pertussis, I am content to call it and deem it a pertussis, if the inspiration and expiration be effected in this manner.

Generally speaking, the long, protracted indraught of air causes a shrill sound, called whooping, to be made by the larynx, which is partially closed by spasm at the time. This partial closing of the larynx, or its aperture, does not seem to me to be the cause of the protraction of the effort of aspiration, since I see in certain cases that the quantity ingested is as great when there is no audible whooping sound as when that sound is most obvious or loudest.

In sneezing there is, as in pertussis, a very great deal of air taken in before the explosion of the out-breathing. Hence, both in the act of sneezing and in that of coughing under pertussis, there appears to be a necessity for filling the lungs to the uttermost, and then for driving out the greatest possible quantity of the residual air of the lungs. In sneezing it is driven out at once—in pertussis by a succession of efforts. It is this peculiarity that makes it be called pertussis.

Sneezing is readily excited by touching the inner surface of the nostrils with a straw, or with Cayenne pepper, or snuff, and a great variety of sternutatories. It is also for many individuals immediately produced by looking at a bright sun. Whooping-cough, which presents some analogy with sneezing, arises from some other, but as yet unknown cause. They are alike, however, in this, that they both require the lungs to be greatly distended with air, and then emptied as completely as possible of what is called the residual air of the lungs.

Some persons look upon the cause of whooping-cough as epidemic, and most people have no doubt of its contagious nature. It is probable, indeed, that there are few families, and very few physicians who do not consider pertussis as communicable by contagion, or presence.

Pertussis, as a general rule, attacks the same individual but once; yet there are met with some exceptional cases of persons who have twice suffered from whooping-cough.

The complaint is so common to young children that it is expected that all the children of the community shall have the

attack, and the common saying that "the child has not had whooping-cough yet," shows how prevalent is the sentiment that the child must have it at some period of its life. Indeed, as far as my observation enables me to judge, there are very few adults to be met with that have not felt its invasion at some period of their lives.

Is a disease necessarily contagious because all the people have either had it, or are expected to have it at some time?

I think that children under two months of age are not so liable to pertussis as those more advanced. I have, it is true, seen children in the month affected with it; but it has oftener happened that when an infant has been born in a family where several young children were laboring with the disease, the neonatus has avoided an attack. Hence, I conclude that a very early infancy serves to obviate, to a certain degree, the operation of the morbific cause. I do not know that children of from six to twelve months old are not quite as liable as those of from one to six years of age.

Pertussis comes on as a common cold, with moderate coryza, and appearance of defluxion to the throat and breast. It is often mistaken for a catarrh during the early stages—for the cough, at first, does not assume the spasmodic character I have spoken of. That is to say, it is not at first attended either by the whooping sound or by the succession of incomplete explosions, continued until the last possible effort is concluded.

Nevertheless, whenever, in a family of young children suffering under pertussis, another child begins to cough, or has a slight coryza, it is common to consider those symptoms as the commencement of the attack.

At first, the paroxysms are not very frequently repeated—occurring not oftener than once in every two hours, which will give about a dozen paroxysms per day. When the disorder, however, is fully formed, the paroxysms of coughing come to be repeated twenty, thirty, and even forty-eight times a day; so that, at last, in such severe forms, the child becomes really ill.

Strong and otherwise healthy children, of two to eight years old, do not appear to be rendered very uncomfortable by paroxysms of pertussis that recur not more than twelve to sixteen times per diem. They preserve their gayety and appetite; they engage in their pastimes with the usual eagerness, and sleep

soundly; sometimes not waking more than twice during the night, to cough; after which they immediately fall asleep again as if nothing had happened.

So, during the day, a child attacked with whooping-cough may continue to be perfectly well, with the exception that it is liable to be suddenly seized with the fit of coughing, during which its appearance is truly distressing; but in a few minutes, having recovered from the fatigue and terror of the moment, it engages with alacrity in its usual diversions or pursuits.

Here we have no fever. If we make auscultation just before the cough comes on, we may have a considerable tracheal or bronchial râle, which is not discoverable in the intervals, or soon after the expuition of the phlegm.

In short, the child is not sick—it has only a whooping-cough; which, in itself considered, is not a much more serious affair than would be an equally violent fit of sneezing, reproduced at the same intervals.

Whooping-cough, as such, is a malady of small moment, but it becomes severe and very dangerous when it is complicated with bronchitis or pneumonia, whether of a lobe or a lobule, and, *à fortiori*, if the patient be seized also with double pneumonia. Hence I think that the physician has in general little occasion to do more than take care to observe the patient from time to time, in order to be aware of the first signs of such dangerous complications.

These complications ought to be suspected whenever the patient is found to be feverish, to lose the appetite, to sleep unsoundly, and to breathe in the whole intervals too frequently. All such events as these now mentioned are alarming, and a careful auscultation of the thorax is the only means to be trusted to clear up the diagnostics of the case.

Up to the period when such symptoms as I have above mentioned begin to show themselves, the patient ought not to be confined to the house, but, on the contrary, should be taken into the open air daily, carefully dressed, however, so as to avoid extremes of warmth or lightness in the habiliments; for doubtless many of the complications of pulmonary inflammation with whooping-cough are the accidental results of taking cold while affected with the specific malady of which we are speaking.

To observe a child affected with a moderate attack of whoop-

ing-cough is to be convinced that he ails nothing except during the momentary fits of spasm and expectoration.

The pulse, the respiration, temperature, color, digestion, and intellectual and moral complacency bespeak not the existence of a serious lesion of the tissues. Yet in a moment, in the twinkling of an eye, the whole physical constitution is agitated under the paroxysm, and so in the succession of attacks until the disease is gone, the child being in the intervals in good apparent health.

Does this serve to show that the disorder is nervous and not inflammatory?

From the foregoing it appears that pertussis, in itself considered, is a complaint that requires but little therapeutical treatment, and that the inconveniences connected with it are slight; whereas, it becomes a very grave affection if it chance to be complicated with other disorders of the respiratory organs.

It is to be dreaded particularly at those critical periods in which the young child is liable to derangements of the digestive organs dependent upon the state of teething. A child shall perhaps with difficulty get through its second summer, even when its respiratory system is unaffected—but it shall with much greater difficulty escape the danger that may threaten its existence, under the forms of bowel complaint and pertussis combined.

If, again, during the existence of an attack of whooping-cough, the child should be assailed with measles or scarlatina, the danger should be at once esteemed very great, since the essentially catarrhal nature of the disorder called measles could scarcely in any case fail to cause a great and perilous extension of the respiratory malady, which is also an essential feature of the pertussis.

Children who have recently recovered from severe attacks of measles are many times found to have irritable lungs for some weeks after the apparent recovery. Slight colds are apt, under such circumstances, to be followed by fever and a renewal of cough and rhonchus or râle. In such a subject, an attack of whooping-cough, commencing before the convalescence is quite completed, must be always regarded as a serious misfortune, inasmuch as the patient will be very likely to be seized with a broncho-pneumonia, not readily curable, since the chronical character of pertussis is almost sure to be imparted to the catarrhal and pneumonic malady.

The duration of whooping-cough is variable—it generally lasts

at least six weeks or forty-two days; often it is protracted during nine weeks, and there are some children in whom the peculiar whooping sound of the cough does not disappear during four months. I have seen children who did not recover until full six months had elapsed, the cough being all the time characterized by the sounds and the manner that give it the name of whoop or pertussis.

And now, the question arises, what is whooping-cough? That is to say, what tissue is the special seat of the lesion of sensation or motion that gives rise to the phenomena?

I cannot perceive that, in a pure, uncomplicated instance of pertussis, there is to be discovered any evidence of disease of the bronchial mucous membrane, or of the parenchyma of the lungs. In all cases, there is, perhaps, some lesion about the glottis and the fauces, including the posterior portions of the pituitary membrane, which, like the causes of sneezing, incites or provokes to frequent attacks of the spasmodic cough.

The child generally seems sensible of the approach of each successive crisis, and that consciousness arises, I believe, from the gradual accumulation of faucial mucus, and possibly of a small quantity of laryngeal viscosities. On such occasions, as the paroxysm approaches, it becomes quiet, ceases to run to and fro, and to play with its toys or companions. It begins to manage its respiration warily, as if fighting off the assault, that would come prematurely on if it should breathe fully and carelessly. Hence its respiration, for a few minutes before the explosion, grows very short and quick, until at last, no longer able to avert the coming tempest, it runs to some chair, or to the nurse's lap, and, laying hold of any convenient support, down goes the diaphragm to the very bottom of the thorax, drawing in after it in its descent a stream of air, narrowed so as to become vocal by the coincident spasm of the muscles of the glottis, until the lungs, thoroughly filled with air, are by a rapid succession of compressions emptied as completely as possible, and then filled again and again until the irritation is done with. In almost all the instances, it is to be noticed that the paroxysm of coughing having been completed, the child rests very quietly, though much fatigued by the late exertion, and one might expect that it is over for the time, but this is not the case; for, after a few moments of tranquillity, the crisis again comes on, and we witness a repetition of the same

scene, often effected with greater violence and effort than was observable as to the antecedent paroxysm or fit. This second fit being done with, the child may be expected to have no further trouble until the next regular period, which may be two hours later, provided the number of fits does not exceed a dozen per diem. I have already said that the number of fits may vary from twelve to forty-eight per day. I think I have never known more than forty-eight of them to occur in any patient of mine during the twenty-four hours; and I say this with great confidence, since I generally advise the nurse to keep memoranda of the returns, in all severe cases, in order from her register to be able to derive a prognostic.

After the fit is over, if it be merely whooping-cough without complication, the child is well enough. It goes to school, or to ride or to walk; it takes its meals with appetite, and though somewhat fatigued with the struggles of the coughing-fits, does not present any signs of ill health, except while coughing, or immediately before or after coughing. It digests well, breathes well, has a natural temperature and a real complacency, which forbids me to suppose that it is really ill.

What, then, is whooping-cough?

When people ask me this question, as to their children, I am apt to reply it is merely the fit of coughing and nothing else; and if the malady should continue to be restrained within that limit, I think that nothing is required but a little time, and some precautions as to dress, exposure, and diet.

I do not prescribe any drug, for I do not know any drug that can cut short the course of the affection, and am not willing to expose the patient to other and dangerous complications by the administration of drugs.

What, then, is whooping-cough?

Without pretending to be able to give a definite answer to this question, I may venture to declare my opinion again that there is not, in the case, any disease of the lungs or fauces or larynx sufficient to account for the phenomena. I have therefore no other means of accounting for the phenomena than a reference of them to a state of the nervous system—I mean a state of that part of the nervous system that presides over the respiratory office.

It is admitted that the function of respiration is under the administration of the medulla oblongata, and I presume few phy-

siologists will deny that states of the medulla oblongata or its nervous dependencies may give rise to symptoms of disease in the subject organs or tissues.

To refer the cause of pertussis to the medulla oblongata is equivalent to calling it a nervous disorder, which is just what I wished to do, and in so doing to designate that part of the nervous mass which I suppose to be the seat of the malady.

I do not pretend to say that the medulla is inflamed, or indurated, or softened, or engorged, or anæmical; for I do not know the nature of the lesion with which it is affected.

The crasis of the nervous substance or cerebral substance is unquestionably liable to frequent changes, affecting its forces or susceptibilities. Probably neither the scalpel nor the lens, nor the chemical reagent, will ever be able to reveal what these modifications are; yet the mind may very well presume to suppose that states, whether transitory or permanent, of hyperæmia or the reverse, shall change the activity of the part so affected.

The blush on a maiden's cheek indicates a state of hyperæmia or congestion of the capillaries of the skin there; such a blush is excited by a passing thought, or by the most trivial incident. Yet such blush, should it take place in the medulla oblongata, at the origins of the spinal accessory nerve, or in the tractus of the vagus, might readily be supposed capable to modify the respiration, even perhaps to the extent of developing a fit of whooping-cough or laryngismus. Such a state of the nervous mass would be the *ipsissimus morbus* in the nervous disorder called pertussis.

In observing the phenomena presented in a case of tubercular meningitis or acute hydrocephalus, one will scarce ever fail of noticing the repeated blushings or suffusions of face in the now insensible or lethargic patient. These blushings never occur without some coincident motions of the body or limbs. As soon as the red suffusion begins to overspread the face, the breathing grows hurried or suspirious; and the carpo-tarsal spasms, and at last slight convulsion of the limbs come to convince us that the superficial blush of the face is also a hyperæmia of the brain, exciting it to the exhibition of the nerve-force whose signs I have above mentioned.

In the disorder called Kopp's asthma, or laryngismus stridulosus, there appears to me to be reason for supposing the whole of the phenomena of the first attack to result from a sudden

hyperæmia of the respiratory lobe, or medulla oblongata. I judge so, because the child is seized in the midst of the most active and joyous health. The attack is always eclampsic. The salaam is instantaneous—and in a few seconds, the whole paroxysm being past, the infant falls asleep, and awakes complacent—gay—in perfect health.

Now, in this salaam, in the laryngismus, and in the pertussis, I cannot discover any structural disease of the larynx, the lungs, or the respiratory muscles, that should account for the symptoms. Structural disease does not come and go in a moment. But I can read in the semeiology of the cases a very clear statement of such conditions of the respiratory brain as may account, to my understanding, for all the signs that I see in the cases. For, I can see the child on its mother's knee, or while at the breast, and while gazing with smiling complacency up to her eyes, seized with the salaam or the laryngismus or the whoop, pass instantly into a condition like that of the dying—and in a few minutes afterwards recover its composure, and manifest all the signs of undisturbed health, which shall continue undisturbed and perfect, to all appearance, for one, two, or four hours, or even for a week, a fortnight, or a month. This may be repeated again and again.

I do not feel disposed to extend these remarks any further at present, because I desire merely to convey to my reader the ideas that I have indulged as to the meaning of the term nervous, as applied to these forms of respiratory disorder. I am far from supposing that it is indifferent for the patient's interest whether we regard the malady as nervous or organic. The decision of the question in the physician's understanding must in an eminent degree determine the course of his conduct in the case.

I have already said that I look upon ordinary whooping-cough as a mere fit of coughing, which is peculiar not only by the long inspirations and the succession of incomplete expirations, and by the whoop, but also by the periodicity. And I repeat, that if the patient have only the whooping-cough, I generally leave him to nature for the cure, preferring to entrust him rather to her power than to the questionable conservatism of any therapeutics whatever. For I feel assured that if my patient has whooping-cough, and nothing else, he will undergo a spontaneous cure, much surer and easier than any of mine. But if his whooping-cough becomes complicated, then I feel called upon to interfere, because nature

has already failed in her processes by admitting the complication. I can no longer trust a nature that has failed to keep the malady in its path, and feel under duresse as to an interference with her operations. I am compelled to interfere.

What is the complication? Perhaps pleuro-pneumonia, perhaps broncho-pneumonia has set in—perhaps the pertussis has gradually converted itself into, or has participated in the nature of laryngismus. Perhaps a mucous or bilious saburra has oppressed the primæ viæ; or the intestinal tube is vexed with acidities or oppressed with flatus or accumulated residue of digestions. Perhaps the heart itself, strained and convulsed under the throes and struggles of the whooping paroxysms, has given way, and endocarditis, commencing upon the half-ruptured valves, is now exerting its pernicious power over the sanguine circulation. These are the inquiries that ought to be made, in order that upon the results of them may be founded the therapeutical indication. How various must be the phases of that indication as affected by the stage of the malady, its seat, and degree of violence?

If, upon due exploration made, it is discovered that a mere neurosis is to be treated, or mere change of rate of action of some part of the nervous mass, then an antispasmodic medication will be selected. This is very frequently done, and is the reason why the preparations of assafetida are so often prescribed, or opium, or valerian, or musk, or belladonna, &c.

For many such instances it is not necessary to go beyond a prescription of camphorated tincture of opium, either alone, or combined with some expectorant, as oxymel of squills or syrup of ipecacuanha.

In some cases, it is desirable to add to these, or accompany the use of them with, a portion of lac assafetida or lac ammoniaci.

If broncho or pleuro-pneumonia should complicate the whooping-cough, the patient should be confined to bed as far as possible until the lungs are disengaged. The pulse should be reduced to a safe rate by a venesection, if it be admissible, which it will be in stout, vigorous children, not yet reduced by fever and irritation and fatigue.

If the venesection be either effected or refrained from, and the bowels have been properly moved by a calomel purge, or one of oil or senna, then the system should be brought under the controlling power of the tartar of antimony. This medicine, given

in very small doses, *citra nauseam*, represses in the most signal manner the violent perturbation of the circulation. It quells the innervative power directly, and through that influence lessens the ardency of the blood's motion and influence. A child two years old ought to get an 80th or a 100th of a grain for the dose, which should not be repeated without first inquiring whether the preceding one had excited symptoms of nausea. It is best to repeat it only in case no sick qualms have arisen.

While the child is under the influence of the tartarized antimony, he ought to be allowed the benefit of an occasional anodyne dose of laudanum, black drop, morphia, or Dover's powder, the last being probably the safest if fever be present.

I am much gratified with the utility of a practice inculcated by the late eminent Dr. Joseph Parrish, of Philadelphia; one on which he laid great stress in his instructions to his pupils, as to the treatment of certain pulmonary disorders in young children.

The treatment in question consists in the application to the nucha and interscapular region of a liniment or embrocation composed of oil of amber, oil of olives, and laudanum.

It is more than twenty years that I am familiar with its good effects in numerous cases, and I very rarely have to conduct a case of mucous disease of the lungs in which I do not order this embrocation to be applied as above three or four times a-day; and I have very good reason to believe that it is not only a good counter-irritant, but, by the inhalation of the vaporized essential oil, a useful expectorant and respiratory antispasmodic. I usually direct equal parts of these substances to be combined and applied with friction two or three times a-day.

In cases where the cough is accompanied with very copious expectoration, and râle, after the acute stage of the complicating bronchitis is past, I rely very much upon the curative influence of doses of alum. This medicine may be given in the form of powders weighing two or five or even ten grains; the powder to be mixed with honey to give it the form of a linctus. Or the medicine may be compounded with honey and water, as follows:

℞.—Sulphat. alum. ʒij;
Mel. despumat. ℥ss;
Aq. fluvial. ℥iiiss vel ℥ivss. M.

Sig. The dose is a dessertspoonful, to be repeated every four or six hours.

It appears to me that the patient bears this salutary medicine better than some of the other formulas in frequent request, and that the influence of it upon the fauces and larynx, as well as upon the state of the circulation generally, is highly beneficial. In a considerable number of patients, it has been the only drug I have prescribed from the beginning to the end of the disorder.

It is expedient in cases of pertussis to regulate the diet of the patient. An over-rich and stimulating diet tends to develop the gastric and circulatory complications of the malady in a positive manner. The child, when the malady is at its highest grade, very often throws off by vomiting the breakfast or dinner that he had shortly before taken, because the spasmodic efforts of screatus draw the stomach into sympathy with the distress of the parts about the throat, in the same manner as tickling the fauces with a feather is apt to do. This very disposition of the stomach to frequent daily disturbance may well be assumed as showing a tendency to complications of gastric disorder with the principal train, and it suggests wise cares as to the allowance of food.

Sometimes the expuition or expectoration of viscous mucus during the paroxysms is very abundant; and in those instances that are attended with much wheezing we may infer that a large proportion of the viscosities find their way into the stomach; indeed, some young children cannot be prevailed on not to swallow the whole of the product. But the accumulation in the primæ viæ of such quantities of mucous saburra must at length interfere with the digestive power, and thus assist in extending the length of the morbid train.

It is probably here that benefit will accrue from the employment of the favorite cochineal mixture, which is composed of carbonate of potash, gum, and water colored with a few grains of cochineal—a mixture that has, since I have been engaged in the practice of physic, been so much relied on in Philadelphia, that I presume there were few cases of pertussis among the children of our population in which it was not used, either under the order of the physician or as a domestic remedy. It appears to me, furthermore, that I have found decided melioration of the symptoms after the exhibition of the remedy, and it is reasonable to suppose that such a medication would prove useful by correcting the tendency to acidity, and by dissolving the viscous mucus, either excreted or ingested into the primæ viæ.

I have not had occasion to notice the beneficial results obtained by the exhibition of belladonna in pertussis, and either through routinism or upon reflection, I remain convinced that the narcotic and antispasmodic influences of the various preparations of opium are not less effectual, while they are more manageable as remedies, than the other powerful narcotic agents in use.

CHAPTER XI.

LARYNGISMUS.

The word strabismus, or squinting, expresses the idea of a certain spasmodic action of the muscles of the eyeball. Other words ending in *ismus* in like manner are expressive of the idea of spasm—as, for example, cheirismus, podismus, sphincterismus, and tenesmus, which severally mean spasm of the hand, the foot, the sphincter muscles, or the whole of the muscles concerned in the acts of defecation, as well as part of the acts of a labor.

The inhalation of the breath, under ordinary circumstances, is not accompanied with any sound—but if the inhalation be performed with violent force, or if the muscles of the glottis should be spasmodically contracted during the act of breathing, a sound more or less loud is produced. When that sound is much prolonged and is also shrill, or whooping, it presents an example of stridulous laryngismus. In this article, I propose to set down my thoughts upon the nature and treatment of the disorder called stridulous laryngismus, or Kopp's asthma, or thymic asthma, and other names, not necessary to repeat here.

In the last article, that on whooping-cough, I have in a measure explained the views I have long held on the subject of certain nervous and spasmodic affections; but, as I hope to present those thoughts more lucidly while writing upon the subject of laryngismus, I have to entreat the indulgence of the reader for certain repetitions that he will notice in the present chapter. I should gladly have tried to avoid reiterating these explanations,

were I not convinced that I should fail to set forth my views should I depend upon referring the reader to antecedent pages, instead of bringing them again into places where they seem to me to be appropriate.

With these prefatory remarks, I now proceed to say that the disorder called laryngismus may be readily mistaken for croup—or may be misconceived of as a case of epilepsy—or even, in an advanced stage, may be regarded as a sample of tubercular meningitis, or hydrocephalus.

The whole disorder has received its denomination from one only of its symptoms, which is the stridulous sound from which the name laryngismus stridulus has been applied to it. It ought, however, to be observed that, in the course of an entire case of the malady, there will be observed many recurrences of the paroxysms in which no stridulous sound can be heard—and, as I believe, many in which there is not even any laryngismus.

A child suffering under whooping-cough is violently affected with laryngismus, and the indraught of air gives out the loud stridulous or whooping sound so well known as a mark of pertussis. Whooping-cough, then, is laryngismus—and it is even laryngismus stridulus; yet it is, on the whole, a very different disorder from that of which we are treating.

The foregoing observations, if they are just, may serve to show that the title of our malady is unhappily chosen, and is likely to mislead us in our pursuit of a true knowledge of the disease. They ought also to show that the spasm of the larynx is not the real disease we are to contend with, but only a symptom or accident of it, and one that is common both to it and to whooping-cough, as well as to some other morbid affections, as typhoid fever, &c.

A great many little children are to be met with, who, in the first days after their birth, seem to acquire with difficulty and very imperfectly, the use of the muscular organs of the respiration; as if the unaccustomed machinery could not at once enter into full and regular play, but rather had need for a sort of education or trial of skill to enable it to do so regularly and perfectly. It is, therefore, a very common thing to observe in them frequent attacks of laryngismus stridulus, that do them, however, no harm at the time, and are not followed by any after evil. Their frequent crowing inspiration depends upon the want of co-ordination in

the movement of different parts of the machinery of the respiration, and it requires not a little practice or training to bring them all into a true and natural and easy consent.

This laryngismus of neonati is usually recovered of by the end of the month; as if the breathing machinery, which at the commencement of its extra-uterine life could not work smoothly and perfectly, should after a few days or weeks come to perform its offices with exact order and the most precise rhythm. In these cases, I presume the laryngismus is a chief source of the trouble; whereas, in pertussis and in the true laryngismus stridulus, I do not suppose the larynx to be the prime seat of the troubled function, but rather the brain and the diaphragm.

Our disorder has been by some persons accounted for on the hypothesis that the thymus gland, becoming unnaturally large, or overgrown, has in some way interfered with the passage of the air along the trachea. But I presume the reader will very promptly reject this theory, when he reflects that, if pressure by an over-large thymus could obstruct the breathing, it could obstruct it continually and not paroxysmally. The patient would be all the time long troubled with laryngismus, and not once a day, or week, or month, as falls out in practice.

But I wish the reader to note (what he shall witness in practice), that, in many of the examples of true laryngismus, the patient utters no sound whatever, or only a natural cry, and then becomes silent until the fit is entirely past. For the most part, the sound made by the child is the regular whoop—just like that fine prolonged shrill sound called the whoop in pertussis.

I have noted the sound in some instances to be a mere whisper, broken with a momentary vocalism at short intervals during the aspiration, until the whole capacity of the lungs being filled up with air, the child either cries out with a loud voice, or goes into the salaam convulsion, or falls into convulsions like ordinary eclampsia, or exhibits merely the uprolled eyeballs, the rigid neck, and the podismus and cheirismus.

The absence of all signs of laryngismus in many of the attacks has persuaded me that the larynx is not in all the cases interested in the evolution of the phenomena; but the same observations filled me with the conviction that the diaphragm is *always* most deeply involved in the malady, and that it is indeed the principal organ affected by the nervous principle of the disease. I have

seen no case in which the diaphragm did not become fixed in motionless rigidity, the child meanwhile turning of a livid hue, and then lying over exanimate with asphyxia like a person plunged into an atmosphere of carbonic gas, or else passing suddenly into one of the forms of convulsion or spasm before enumerated.

I do not expect to be misunderstood as to my opinion of the grave nature of laryngismus in consequence of my remarks on the crowing respiration of infants in the month. Such children rarely have been attacked with the violent malady which we are considering.

But, as children approach the eighth or twelfth month, the signs of laryngismus ought to be held as always worthy of attention—or even as presenting very alarming symptoms of a disorder of that portion of the nervous system upon which the respiratory innervations depend.

I consider such an attack as evincive of very great danger to the child's life; and even where the attack soon passes off, leaving the patient without any appearance of ill health for many days, or even weeks afterwards, the vigilance of the nurses should be stimulated by assurances that the paroxysms will be almost sure to return, and that with increased violence and greater danger to life.

On the 4th of January, 1847, ——, a beautiful boy, six months old, very ruddy, fat, strong, and full of spirits and health, was sitting upon his mother's lap smiling, after having just come from a full breast. In an instant, in the twinkling of an eye, he made the crowing sound of a protracted inspiration—he had carpopedal spasm—his trunk was affected with opisthotonos, his head rotated to the right in strong extension, the eyes were uprolled and to the right, until he became perfectly rigid and still—from which state he passed into convulsion, with purple face and hands. The whole scene lasted not more than three minutes, soon after which he slept, and then awoke in the most perfect health and gayety. I soon reached the house, and found him without symptoms.

There had been no premonitory stage or sign of this violent paroxysm, nor was the attack followed by any the least sign of indisposition from the 5th to the 10th; but, on the 11th of January, seven days after the first seizure, the attack was repeated, and

again on the 12th. From this time they were renewed frequently, and he expired on the 3d of February, thirty days after the principal seizure.

Up to a late period of the illness, he showed but small evidences of the power of the malady, except while struggling with the laryngismus, or writhing with the convulsion. He evidently died from the extension of a nervous disorder to the cerebellum and cerebral hemispheres. I did not obtain leave to examine the nature of the encephalic lesions after his death.

Inasmuch as my feelings were deeply interested in the case in question, and as my attentions to the child were assiduously given, I had a great many opportunities to study the character of the malady in its various phases; and it is with the most absolute conviction that I declare I could by no means, in the earlier days of the case, find in the state of his pulse or respiration, temperature, digestion, defecation, or any of the secretions, occasions to which I could refer the paroxysms of laryngismus, with the consequent convulsions.

When laryngismus is once begun, it seems to me there is no difficulty in accounting for the subsequent lapses that take place in the health; which may be explained by the repeated suspensions of the aërating processes, under which arrests, the mass of the blood grows rapidly vitiate, and in so much, either inefficacious as to the nervous mass, or absolutely poisonous for it.

The writers on this malady seem to be agreed that the term laryngismus is an appropriate one, though Dr. Marshall Hall says it might lead the thoughts of the physician away from a state of the general nervous system to that of the larynx. Dr. Marshall Hall, in this caveat, very justly dissuades from the idea that the malady is topical, as in the larynx proper. Yet he appears to me not to have wholly liberated himself from the thrall against which he would guard his readers. He speaks too much of, and lays too great a stress upon, the idea of the laryngeal element—the laryngismus. At least so it appears to me, after careful and oft repeated clinical analyses of the phenomena presented by the sick child.

I am persuaded that there is more concern of the diaphragm than of the larynx in these paroxysms of so-called laryngismus. And I beg to call the attention of the practitioner to the phenomena observable in all cases of pertussis, in which we have the

most remarkable and stridulous laryngismus coinciding with convulsive actions of the diaphragm, and other respiratory muscles, very rarely indeed, yet on some occasions, extending to the voluntary muscles also, just as happens in our cases of laryngismus stridulus.

Now, no man, so far as I know, thinks of referring the violence of a pertussis paroxysm to a status of the larynx. On the contrary, it is universal to assign to a spasmodic condition of the diaphragm the insatiable indraught of the breath, followed by the successive and equally insatiable expirations of it, until, the fit being concluded, the patient returns in a few moments to its play, its food, or its sleep, and is, throughout the entire interval between the fits, in a sound and complacent health, as far as to any visible signs at least.

What then is the fault? Is whooping-cough a laryngeal or a bronchial catarrh? By no means; though it often becomes complicated with either or both of those maladies, which then are accidents that supervene, and not necessarily attendant symptoms.

I do not perceive any reason why we should make a very trenchant difference betwixt the two forms of disorder, at least as to their more essential and vital characteristics. I conceive they are both categories of a similar affection of the nervous mass appropriated to the acts of respiration, and that they are in fact nervous disorders.

In using this phrase, nervous disorder, I do not desire to make a vague declaration of some abstraction of the thought—I mean a disorder of the nervous mass—the neurine—the very substance of which brain, ganglion, and nerve consist. And I will take advantage of the opportunity to state somewhat at length the opinions at which I have arrived on these points, because I suppose I shall not clearly set forth my views of laryngismus unless I do so.

In another publication, I have put down my full assent to the idea of the physio-philosophers that the nervous substance of a living creature is essentially the creature, and that all else within it is composed out of, and lives in and by it, the nervous mass alone. That the organs and tissues are developments effectuated upon the distal termini of nerves, and in that sense compose the machinery by which the nervous mass lives, and acts, and manifests itself as living.

Without entering into the vain discussion as to whether the spinal marrow is a mere fasciculus of nerves passing conveniently and safely along the spinal canal to the brain, the common source and centre of the living force and so seat of the soul, I prefer the dogma that *anima est tota in toto, et in qualibet parte tota.*

I do not regard the nervous mass as the soul, neither the force developed in it by the reagent, oxygen, as the soul. I know not what the soul's essence is, while I believe that it is both immortal and responsible.

To me it is sufficient that the human body is united to an immaterial soul which exhibits its power by maintaining the existence of the body during its union with it, and therefore during its union with a physical matter, the nervous mass, to wit.

But laying aside for the present any further allusion to the soul, and coming downwards to the material essences, with the nature and actions of which we may be allowed to be more conversant, I would repeat the expressions of Lorenz Oken, from the Physio-philosophy, at page 328:—

1804. "The fundamental substance of the animal is point-substance; but, since the essence of the animal consists in its being a sensitive substance, so must it belong to the latter's essence, that it be atomic or punctiform. The point-texture is equivalent to the sensitive mass."

1805. * * * * "The lowest animals, such as the infusoria, polyps, medusæ, or sea-nettles, in short, all myxozoa or mucous animals, consist of this point-substance, and are wholly sensitive mass."

1806. "The sensitive mass is called in higher animals, *nervous-mass*. The nervous texture is a conjoined series of mucous-granules, which have become albuminous in character. * * * * At the first instant of the origin of organic matter, it can, however, originate only as infinitely numerous points."

1807. "Granular or point-mass is, however, an accumulation of centres. The nervous mass is, therefore, in accordance with the conception of the organic, a repeated, multiplied centre."

1808. "The animal substance has commenced with the nervous mass; thus with that which is the highest, and which physiologists have deemed the ultimate mass. The origin of the animal is from the nerves, and all anatomical systems are only free evolutions or separations from the nervous mass. THE ANIMAL IS

NAUGHT BUT NERVE. What it is further, or in addition, is obtained elsewhere, or is a metamorphosis of nerves. The mucus of the infusoria, polyps, and medusæ, is nervous substance upon the lowest stage or degree, where the other substances that are therein involved or merged have not as yet been perfected in an isolated manner."

In paragraph 1811, he compares the nervous mass to the sun as centre of the solar system, the organs and tissues to the planets, "and the nerves," says he, "traverse the same like radiating, illuminant, heating, and moving ether. It is a positing of the centre in the periphery."

1812. "When, also, the other portions have been formed out of the identical mass, still the whole animal body is naught but nervous mass, only, in a crude or inert condition. There is, consequently, no point upon the body, on which the nervous phenomena are absolutely wanting, or where they may not appear under certain relations."

The above citations of the Zurich philosopher serve clearly to show his opinion, that the real essential or material union of the psychical and physical being exists in the substance which we call nervous substance; and in this opinion he is sustained by Cuvier, and his expositor Flourens, from the latter of whom only I shall here quote a passage, to be found in his *Analyse Raisonnée des Travaux de Georges Cuvier*, p. 88.

M. Flourens is speaking of the principles of a method in natural history, and he says: "La forme du système nerveux détermine donc la forme de tout l'animal, et la raison en est simple; c'est qu'au fond, le système nerveux est tout l'animal en effet, et que tous les autres systèmes ne sont la que pour le servir et l'entretenir."

Such are the expressions of M. Flourens, to whom we are indebted, perhaps, more than to any living author, for clear and practical views of the nature of the nervous system. For my own part, without feeling in general bound to adopt whatever explanations or rationales of life may be presented to me by men we call authorities, I freely admit that there is in me a tendency to surrender my judgment to the dicta of Lorenz Oken, notwithstanding the salutary declaration of St. Augustin, "*Quod scimus debemus rationi; quod credimus, auctoritati;*" expressions that ought to serve as a motto and general declaration of independence for all

persons devoted to scientific pursuits. But of such authorities as Oken, it might almost be correct to say, in believing after him, *quod credimus scimus*.

Taking the foregoing declarations and statements of those distinguished physio-philosophers as a basis of physiological truth, the question issues from it as to what are the nature and extent of the force with which nervous mass is endowed. And here, it seems to me, we can arrive at only one conclusion, videlicet, that the powers of the nervous substance are dual—impressionability and irritability, or vital contractility, depending on a nervous force acting upon living organism.

It is to be observed that I do not here use the words *perceptivity* and *motility*, or the words *sensibility* and *irritability*.

In my opinion, it would have been better for the interests of such researches, had philosophers universally adopted and retained the latter denominations given to these faculties by the illustrious Haller, which certainly do in a sufficiently comprehensible manner, and most concisely express, 1st, the idea that a part of, or a whole organism may perceive that it is touched, or changed, or affected; and 2d, that it thereupon can or does alter its density through an act of coacervation of its substance.

This, in fact, is the idea of Francis Glisson, who is the original author of the physiological doctrine of sensibility and irritability, though, as I have above said, they were firmly established by the illustrious Haller.

Glisson's whole doctrine might be nearly written on one's thumb-nail, and is by him thus stated in the *Tractat. de Ventric. et Intest.*, cap. vii. p. 147:—

"Motiva fibrarum facultas, nisi irritabilis foret, vel perpetuo quiesceret, vel perpetuo idem ageret. * * * * * Hæc autem supponit perceptionem et appetitum, ut de novo fibra excitetur. Data vero perceptione, appetitus et motus lege naturæ consequentur: ita ut declaratio solius perceptionis fibrarum ad earum irritabilitatem manifestandum sufficiat."

Haller, *Physiologia*, tom. iv. p. 556, says, "Mihi hactenus res liquida videtur, vim contractilem naturalem et insitam musculi, a voluntatis imperio augeri."

Glisson's argument, that the vital activity which we call *contractility*, would either be ever active, or, once at rest, would never recommence but for a certain perception and appetency that are

indissolubly connected with the faculty or nature of irritability, and Haller's concise statement that the *vis insita* and the voluntary contractility of muscles are one and the same, the latter being governed by the will, are so clear, that no doubt need rest on the mind as to the sentiment of those great thinkers; and I, for my own part, feel not at all disposed to go behind those philosophers to seek for other qualifications of the forces of nervous mass than the two I have already mentioned. I mean *impressionability* and *motility*, or what I should be content to see denominated the *sensor* and *motor powers of nervous mass.*

Intelligent perception is another category; and it belongs to the understanding, to the conscious nature which is the immaterial individuality—the *ego*—the *me.*

As to nervous mass, whether it be regarded in its condition as cortical or medullary substance; whether as the material of ganglion, plexus, nerve, or nervous expansion, I cannot suppose it endowed with any other faculty than sensation, in itself considered, which state of sensation determines in the parts subservient to it an act of coacervation; so that Glisson's idea of irritability, as depending upon a natural perception, to which is inseparably attached an *appetitus* and *motus naturalis*, fulfils the demands of my reason on this point.

Nervous mass exists not alone as such—it is always co-existent with organic matter, to which it communicates the power of vital motion or irritability. The antagonism of nervous mass with organic matter is of the nature of polar force. The sensor and motor force are in this sense polar forces. Incident and reflex, perceptive and motor—either of these terms is equal to sensibility and contractility.

Sensation is not necessarily conscious or intelligent perception, though it may rise to that elevation in the more complicated animals; whereas, in the lowest forms of the zoophytes, it scarcely exceeds, in the entire animal, the amount of the same faculty with which single organs or anatomical systems are endowed in the mammifera and man.

To possess the power of sensation and motion, it is necessary to suppose the coincident existence of a nerve punctum with other organic matter; as, for example, in the macula germinativa of the germinal vesicle. In this germinal spot, we may fairly suppose to be seated a *perceptio naturalis*, in virtue of which the

germinal nucleus determines the series of changing and plastic operations that cause the embryonic metamorphoses. So every cell which selects or admits its cytoblastem can do so only by the force of a point-tissue, whose nature is nervous.

The nervous mass being the essential animal, then that mass determines the form of the animal, and its place in the zoological system. The animal is vertebrate, articulate, molluscous, or radiate, in consequence of the peculiar form and arrangement of its nervous mass; and it takes its place not only in the division, but also in the class, order, genus, and species, and even variety, solely on account of the behavior of its nervous mass.

The nervous mass makes the animal; of course the nervous mass makes the organs of the animal, and maintains their several anatomical forms and characteristics during the entire lifetime of the animal.

In this sense, the optic nerve makes the eye, being aided in so doing by the fifth and sixth nerves. The eye thus constructed is the machinery or servitor of the especial bulb whose most dominant and concentrated force is seated in the tubercula quadrigemina; but all the nervous mass of the eye is the eye; though the retina, which is the expanded optic nerve, is in truth the tubercula quadrigemina produced or protracted in order to meet the light at the surface of the animal.

Another nerve makes the lungs. This nerve, or rather nervous mass, is founded in the medulla oblongata, whence radiate the influences that determine the action of the machinery of respiration. In this sense, the medulla oblongata is the breathing or oxygenating brain, while the tubercula quadrigemina compose the seeing brain.

Another nerve develops the liver, and it is the bile nerve. One makes the spleen—the kidneys—the ovary—the uterus—the stomach; and they ought severally to be regarded as the bile nerve, the splenic nerve, the renal, ovaric, uterine, and gastric nerve, and so forth to the entire edification and composition of the living, sentient animal.

Is such an animal sick? is any one of its organs sick? The nerve that composed and that dominates that organ is sick. It is impossible to suppose that the organ can be sick through any other way; for the life of the organ is in the nervous mass of it,

and it cannot vary but with the varying crasis or forces of the same nervous mass.

Nervous disorders, therefore, are disorders of the nervous substance or mass, whether of the sum or whether of the aliquot parts thereof.

If I am invited to state what are the modifications of nervous mass that cause the morbid manifestations of force observed in disease, I must reply that I know them not.

Hardening or softening, hypertrophy, various cephalomatous degenerations, hernia, wounds, etc., are the affections that meet the eye of the physician and the necroscopist; but in the crasis of a material so soft as the brain, which has been called the granular *bouillie* of the brain, there may be modifications so fine and delicate as to escape the researches of the anatomist and the microscopist or chemist, which should yet be capable of giving rise to various diseases, psychical or physiological. The scalpel and lens cannot detect them; but reason's analysis can know them clearly without the grosser aids of the senses, for reason can detect them through her observation of the conditions of existence in all cases wherein the law of those conditions is broken.

In studying the various disorders of the human frame, we are too apt to confine our regards to the state of the parts in which disease is manifest by certain signs—such as inflammation, or pain, or weakness, etc. In many disorders, however, we do know that, while the symptoms are referable to the stomach, the cause may be really existent in the brain, in the uterus, in the mouth, etc. etc. The section of a nerve, as is well known, may speedily cause hopeless ulceration of the cornea, or red injection of the adnata.

A blow on the head causes an attack of vomiting; or a saburral state of the stomach gives rise to intolerable headache, to vertigo or convulsion. Such examples are so numerous that it would be a long task to enumerate them.

In the same manner, certain modes of the brain or the nervous mass, of parts of the brain, or parts of the nervous mass, may give rise to manifestation of disordered action in the parts dominated by the special system of nerves.

I do not fear, in this place, the charge of a leaning to the side of phrenology, as referring all the organs, for their dominant of nervous force, to some special organ or seat in the brain—thus,

as it were, admitting that the brain is multiple. M. Flourens' fine argument on that subject has satisfied my mind most fully; nor indeed is there any necessary alliance between the idea of phrenological organs and the idea of nervus tractus passing from the organs to the neurine, even supposing the whole of them to be transmitted through the spinal cord, which in that case would be only the general fascicle of the nerves of the organs passing from and to the brain.

The occurrences of a long clinical experience might serve to show any practitioner innumerable examples of diseases suddenly manifesting themselves in the organs of the body without the antecedent occurrence of any morbific causes acting directly upon those organs. Such cases present examples of sudden suspension or diminution, or exaggeration of the motor or sensor forces of the organs in question. When such disorders disappear in the same sudden incomprehensible manner, the phenomena can be accounted for by supposing the sudden restoration or redintegration of the dominant sensor or motor forces. But where is the seat of these dominants of the organs? Are they not resident in the nervous mass, and chiefly in the great encephalic bulbs thereof?

How many times have we seen gout or rheumatism of the articulations, exquisitely characterized by the *tumor*, *rubor*, *calor*, *et dolor* of inflammation, yea, even enormous inflammation, disappear almost as by the stroke of a magic wand, or reappear with equal violence and haste in another part; and so, again and again, until many of the articulations have suffered in turn from the irritation! Is it possible to account for these circumstances upon any considerations of an anatomical structure of the inflamed parts merely; whereas, those parts which are maintained in crasis, in power, and development by the vitalizing, irradiating, developing energy of the nervous mass, are merely the machinery and servitors of the living, and only living, nervous mass.

I have already said that, if I am asked what are the changes or modes of the nervous mass that bring about these phenomena of diseases, I know them not. But this I do know—videlicet, that a man has within him a free-will force, which, by the mere dicta of his soul, sends the motor power to his voluntary organs—or which, under circumstances of peculiar emotion, gives manifestation to the various passions of the soul. That the dicta of the free-will, and the turbulent demonstrations of the emotional powers

do coincide with changes of mode of the nervous mass is no more deniable than the dogma of the immateriality of the human soul and its union with the physical body of man. Yet what fine modifications of the nervous mass are those that enable a Grisi or a Jenny Lind to hold in rapturous suspense the crowded audiences that breathlessly listen to the tuneful modulations of the voices of those enchantresses! It is the vocal organ, the larynx, that moves—that is affected—that modulates the expression which is willed by the soul of the songstress, through a power in that soul, to produce modes of the nervous mass whose powers are by the nerves radiated to the delicate muscles of the throat.

A child, smiling upon its mother's knee, apparently in the midst of the most exuberant health, is suddenly seized with laryngismus stridulus, becomes convulsed, then lies profoundly insensible, and soon afterwards recovers its gayety and all its apparent health. Where, in this case, is the disease? Is it the brain that is sick, or is it in the throat that the malady is really to be found? If we imitate the acts of a patient in laryngismus, which is easily to be done, where is the fountain and source of the modifications, of the laryngeal function that we voluntarily produce or execute? Are they not in the brain? Is not the brain the material organ by which the free and intelligent will operates upon the voluntary organs of the nervous mass?

I cannot, after the above considerations, discover in cases of laryngismus the signs of any other than purely nervous disorders; and when I come to this conclusion, I am prepared already to feel no surprise or astonishment when I observe the paroxysms to be repeated, to become more and more violent, to be repeated at shorter intervals, and be less and less perfectly recovered from —to have at last a feverish interval—to observe the intellectual faculties more and more clouded, while the body wastes or becomes softer and flaccid, and at length to see my patient lying in the hopeless apathy of tuberculous meningitis or hydrocephalus: nor yet, when I see him suddenly, as in the twinkling of an eye, cut off—dying in the act of making the accustomed salaam.

I have had many opportunities to observe the course of the paroxysm of laryngismus. The child suddenly begins to catch its breath, as if strangled. In the effort to breathe, the stridulous

inspiration is heard in most instances, but not always. The head is extended rolled to the right or left; the eyeballs are strained upwards; the arms and legs become stiff, and the act of respiration seems to be suspended, as if some power were interfering with the further descent of the diaphragm. In fact, the diaphragm, after having descended perhaps only a half-stroke, stops as if seized with spasm. It comes to a complete stand-still, and neither relaxes nor contracts any further. The larynx, in the meantime, is not drawn downwards along the throat; but the whole body becomes statue-like, as if all the muscles were suddenly affected with cataleptic spasm. At length, when the blood, upon this suspension of the aërating process, has become sufficiently dark or venous, relaxation of the cataleptic rigidity takes place, which is very likely to be followed by general convulsion of the trunk and limbs, after which the child, becoming quiet and insensible, passes gradually into a state of sleep, and wakes again without indisposition.

Having many times observed this process, I feel quite sure that my description is correct; for I have noted the several steps of this process in the *naked* child, holding my hand upon the epigastrium in order the more surely to ascertain the state of action of the diaphragm—and I repeat the assertion of my belief that the diaphragm is the chief organ affected in this laryngismus stridulus, and that the affection is of the nature of the cataleptic rigidity and fixity of muscles. Dr. Good, Dr. Marshall Hall, and others, denominate the disease as I have done after them, laryngismus. Were I authorized to propose a name for the malady, I should greatly prefer to call it phrenismus—as indicating the real seat of the organic trouble. I do not mean in this to dissent from the opinion that the larynx is spasmodically affected in such a manner as to cause the stridulous sound of the inspiration, but I do deny that the crisis of the paroxysm depends upon the absolute closure of that tube, and a thereupon consequent suspension of the respiratory processes; and I assert that the arrest or suspension of the respiratory act is due to the cataleptic spasm of the diaphragm itself and of it alone, instead of to the closure of the larynx. I have earnestly observed the larynx during the paroxysm of laryngismus to learn whether or no it descends towards the bottom of the throat during the supposed closure of the glottis, and I have always found it to be quite still. If the diaphragm should continue to contract while

the larynx should be closed by spasm, the descent would be very decided, as I have seen it in cases of suffocation by foreign bodies in the larynx, and in pseudo-membranous croup. This proves, as I suppose, that the diaphragm is more in fault than the larynx.

Having frequently in the spasms of the limbs in cholera, in the spasms of the masseter and temporal muscles in the locked jaw of hysteria, observed the instant resolution of those spasms or cramps upon the application of cold to the affected muscles, I have pursued the same plan of treatment for obviating the paroxysm of laryngismus, or rather, phrenismus.

As soon as the patient gives evidence of the approach of an attack, I direct a lump of ice, wrapped in a handkerchief or napkin, to be applied to the epigaster and moved along the arch of the hypochondria. It will be almost universally found that the touch of the ice resolves the spasm or cramp of the diaphragm, and that the child begins immediately to cry, and that without laryngismus, and without passing into convulsions.

This practice I have repeated so often with my own hands, and have so often directed it by other's hands with similar effects, that I most confidently recommend it to the reader as applicable in all such cases, and as a most desirable method of causing the fit to abort.

If we can, in any instance of the attacks, cause the paroxysm to miscarry by reestablishing the suspended respiration, we shall in so far tend very stoutly to the recovery of the patient. Every successive paroxysm passing into general convulsions is most mischievous to the nervous mass, and aids to spread the disorder, at first located solely in the medulla oblongata, to the cerebellum, and so to the cerebrum and the whole encephalon.

It has been supposed that an attack of laryngismus would be impossible in a person in whom an eliptical segment should have been previously removed from the trachea as in laryngotomy; and I have heard it asserted that epileptic convulsions could not occur in such persons. If we can cause the fit to abort by means of ice placed on the epigastrium, as has been proposed, we shall make use of it as a much preferable method.

Assuming for a moment that I am correct in asserting that the primary acts or modes of this disease (laryngismus) are resident in the medulla oblongata, the seat of the respiratory or oxygenating power, and that the first outward manifestations of it are to be

seen in the stridulous respiration, I have no difficulty to trace up the succeeding steps of the paroxysm.

Let the diaphragm, upon a partial inspiration, be affected with the cataleptic spasm that I proposed just now to denominate phrenismus—let the rima glottidis be at the same moment partially closed, so that the patient shall remain for ten or even fifteen seconds without the least respiratory act, and I see the blood rapidly changing from red to black, passing slowly and languidly through the heart, and reaching the brain without its endowment of oxygen!—what next?—the next step is either an extinction of life, or an irregular and convulsive innervation of the whole muscular system, with comatose insensibility, and all the marks of a great cyanosis. These are the steps or train of the symptoms.

In the convulsions of the puerperal eclampsia, the train of events is different. In that case, the heated blood is driven in rapid streams into the encephalon—which is over-excited by the excess of oxygen it receives, and over-stimulated by the repeated *ictus cordis* transmitted through the arteries and capillaries. Under such circumstances, intense but irregular muscular action is excited—sometimes even while the patient is in the act of speaking or using her free-will force to bear down the labour-pain. It very soon happens, however, that the course of the blood becomes checked in consequence of the spasmodic state of the respiration, and the fit ends in a transitory cyanosis. In laryngismus, it begins and ends by a commencing and ending cyanosis; for in laryngismus, the first act consists in the contraction of the diaphragm and glottis to a certain point, at which both become fixed by cataleptic spasm, and thence the following train of blackening blood, convulsive state of the general muscular system, and comatose insensibility, passing either into natural sleep or issuing in death.

In the foregoing statement of my views as to the paroxysm of laryngismus, I have depicted the fit as it does most ordinarily occur. It might be that the reader should find a discrepancy between this account and a correct one of the salaam convulsion, and thus question the correctness of my rationale.

The salaam convulsion is laryngismus under a peculiar form. The patient is suddenly seized with the stridulous aspiration, and as suddenly flexes his whole body—bending the head down towards the knees, and that with such violence as to strike the

forehead forcibly upon the floor if he happen at the time to be sitting upon it. If the child should be in the nurse's arms at the time of the attack, he makes the stridulous sound of laryngismus, and immediately bends his head forwards in a bow to the knees, resting so, immovable, until the fit goes off, or until several convulsions take the place of the flexional or emprosthotonic movement. To be thus suddenly affected with flexional convulsion is proof positive that the cause of the malady is in the brain or spinal cord, implicating it partially—and while one partial implication might produce a complete emprosthotonos, another should cause distortion to the right side or to the left side, as the case might be. The experiments of Mr. Flourens, in slicing away the brain, show that it is in the power of the experimenter to give this or that form of muscular action at will.

Although salaam convulsion is a less common form than the other, either form of laryngismus is met with sufficiently often to show that the malady, in either case, is one of the nervous mass of the encephalon, suddenly arresting the process of aëration of the blood.

I have, while penning this paragraph, a remarkably beautiful boy seven months old under my care, laboring with attacks of salaam convulsion and laryngismus stridulus.

Soon after his birth, he was seized with crusta lactea, which gave rise to excessive irritation, though it did not appear to interfere with his nutrition, as he grew very fat and strong notwithstanding the wakefulness and the frequent fits of crying caused by the itching and pain of his eruption. At the age of five months, his crusta had very nearly disappeared. After this, he was attacked with severe coryza, which interfered with his ability to suck, and caused so great an obstruction of the nostrils that nearly the whole of his respiration was carried on through the fauces.

The severity of the coryza having abated, I concluded I should have no further cause of anxiety as to the patient, when suddenly, on the 5th of February, he was seized with convulsions while playing in his mother's arms, soon after having taken the breast, at 8 o'clock P. M. A second attack occurred on the 6th, at 6 A. M., and a third at 6 P. M. of the same day. This attack was very severe. April 5th, 5½ A. M., he had a fourth attack, which ended in a deep, calm sleep, from which he awoke in apparent

health. The fifth seizure took place on the 10th, at 8 A. M., and the sixth on the 19th, at 7½ A. M.

On the 25th, at 4¼ P. M., he was violently seized with the laryngismus and salaam while in the street in his nurse's arms. In this instance, the attack appears to have been brought on by his sudden terror at the sound of a noisy cart driven along the street. It was complete salaam, but attended with laryngismus stridulus.

May 4th, his eighth paroxysm occurred at 6 P. M. The ninth, which was violent, took place on the 11th, at 5½ P. M., and the tenth at 6½ P. M., of the 20th May. The latter was mild—the child fell asleep as soon as his feet were plunged in warm water. He slept favorably during that day, and was very cheerful and gay after it, with good appetite, glowing cheeks, bright, laughing eyes, and every appearance of perfect health save a slight coryza, from which he has never been quite free, and some symptoms of a return of the crusta lactea on the face. He suffered a slight attack on the 21st of June, and another on the 5th of July. In both these cases there was no whoop, but only a sudden, sharp outcry, or rather scream—just as the salaam came on.

In the foregoing relation, I have not laid any particular stress upon a circumstance which, nevertheless, appears to me worthy of a mature consideration—I mean to allude to the coryza.

If, at any time, one closes the lips of the child by pushing up the chin so as to compel the lips into close contact, the boy is immediately affected with dyspnœa to that degree as to oblige him to struggle violently to get his mouth open. He does draw a small portion of air through the nostrils, yet not enough to aerate his blood properly. In sleeping, in sucking, &c., when the respiration cannot take place by the fauces, it is imperfectly effected through the nares—and so, I imagine that, in a long succession of days, the infant evinces the evil influence of an incomplete or non-competent aeration. Upon the failure of a competent aeration may be founded certain modifications of the blood, and certain coincident conditions of the nervous mass, bringing the latter, at length, to a point at which the convulsive phenomena of laryngismus begin to manifest themselves.

I am confident that convulsions frequently occur from transitory attacks of cyanosis neonatorum, and that they depend on the

faulty aeration of the blood in the paroxysm, and cease on the return of the circulation through its proper channels in the heart.

Without being so confident that in W. T.'s case, above stated, there is a direct connection of the laryngismus and salaam with an obstructed respiration by the nares, I deem the observation of sufficient importance to be worthy of attention, and I make it with the hope that some other observer may take the pains to consider what relation, if any, does exist betwixt laryngismus and coryza. Certainly, if enlarged thymus could reasonably be accused of giving rise to the fits, they may as reasonably be supposed to arise from obstructed nostrils. I am the more led to attribute importance to this rationale than I should otherwise be, by the facts of a case lately under my care in this city.

It was the case of Miss * * * *, Clinton Street, affected with typhoid fever. When she had become very ill, she was seized with symptoms of typhomania, and had the most violent assaults of a combination of pharyngismus and laryngismus with phrenismus, and rigid spasms of the limbs. Her life was despaired of by very good judges—especially founding that opinion on the tonic spasm of the arms.

Sitting by her one day, and perceiving that she breathed through the fauces only, I shut her lips together and then learned that the irritation of the stomal and faucial mucous membranes had extended itself also to the nares, and that she could scarcely make even the smallest aspiration by the nostrils. This arose from the collapse of the Schneiderian surfaces in consequence of their inflammation.

I took a camel-hair pencil, and having dipped it in a glass of water, I repeatedly put it in each nostril in order to bathe or bedew the dried and half-crisped surfaces with the cooling liquid.

Upon effecting my purpose, I discovered with pleasure that the young lady could breathe with greater ease, and that she was manifestly soothed and relieved by the ministration.

The above sickness lasted about seventy days; during some ten or fifteen of those days, she required very many times, daily and nightly, the application of the pencil dipped in water to relieve her breathing.

No doubt was left upon my mind, or on those of her family and friends, that the effect of this humectation of the mucous surface of the Schneiderian membrane was most signal in the relief of

some of the worst symptoms of the young lady; and it was evident that too long a delay in the re-application of the remedy always left her exposed to renewed attacks of the pharyngismus and other spasmodic states of the muscles of the throat. Her recovery, which by many could not be hoped for, is in my opinion to be attributed in the main to this particular care. Without it, the oxygenation of the blood must have grown less and less complete, to the ultimate overthrow of the great functions of the circulation, the respiration, and the innervation.

I think it cannot be too frequently repeated, or remembered, that the powers of life in the mammifera exist within a triangle, at whose angles are severally placed the brain, the lungs, and the heart, or the innervation, the oxygenation, and the circulation. Such is the great doctrine of Bichat, whose exposition of this single doctrine ought to give him immortal renown, even were his claims confined to this sole philosophical service.

But if it be true that life exists within this triangle of the circulation, respiration, and innervation, and that life cannot cease save by the abolition of one of these three elementary powers, whose abolition is almost instantly followed by that of both the others, it follows, as Bichat says, that we may die because the innervation ceases, or because the respiration (oxygenation) ceases, or because the circulation is arrested.

Whatever circumstance contravenes either of these great and primary acts of the life tends to induce death; and I doubt not that in very young children, or in adults reduced to great weakness by disease, the often unnoticed obstruction of the respiration brought on by coryza, or by engorgement or submucous infiltration of the Schneiderian membrane is the determining cause of the fatal issue of the cases—results that might perhaps be obviated by attention to the Schneiderian membrane like that I bestowed in Miss * * * *'s attack of typhoid fever; and in many other instances, some of which I have related in my tract on coryza in the earlier part of this volume, and in my article on coryza in the work entitled "Obstetrics, the Science, and the Art."

The treatment of laryngismus must always depend upon the special indications of the cases; and these must vary greatly in view of the hygienic circumstances, the age, constitution, and topical malady of the sufferer.

It has happened that several children of the same parents have

been assailed with the disease, which might naturally lead to the inference of a heritable tendency in such children—or to the idea that the mother's milk causes the derangement of the health.

It might well be supposed where many children of the same parents perish with this peculiar form of nervous disorder, that they had been endowed, *ab initio*, with a faulty nervous mass, which at the proper age should lead to the explosion of the convulsive attacks. If a child may inherit blue eyes, or red hair, or a sixth finger, or a tendency to scrofula, or gout, insanity, or a bad or a good temper, it is not difficult to conceive that it might in like manner in the very origin of its life obtain an impress, or a tendency of nervous character that should expose it to a great risk from the assault of laryngismus.

Should we then, in any case, have reason to fear a heritable disposition to the malady, we should, as far as circumstances might warrant, oppose and change the natural propensities of the patient in this way.

The character of the future health depends in a considerable degree upon the mode of bringing up the child, as to its nutrition, dress, exposure, &c. &c.

Should the heritable tendency be supposed to descend from the father, it would be futile to take any precautions as against the mother's influence; but if they should seem to come from the line of the mother's family, then it would be but a duty to wean the infant from her breast, and bring it up at another woman's.

We certainly do meet in practice with families of young children that thrive in the ruddiest health under the care of a wet nurse, whereas, such of them as had been suckled by the mother were never well, or some of them were even lost, and that solely because the mother's milk always disagreed, and so laid the foundations of fatal illness.

Now, inasmuch as we are likely to be much at a loss to decide upon the true cause, the *ipsissimus morbus* in some of our laryngismus cases, it might be well always to weigh the question as to weaning the child wholly from the breast, or giving it another nurse. This is a question not for me to decide in this little work, but for the physician in the special case; and I shall confine my remarks upon it to the mere act of presenting it as one of the items, which he alone is competent to judge of, but which it will be his duty in all instances to consider.

Many children being provided with wet nurses in consequence of the inability of their own mothers, it might well be that such a nurse should give a kind of milk unsuitable for the child, and, therefore, be the prime cause of the nervous disorder.

Such a wet nurse ought to be changed for another, if upon due inquiry no other probable cause could be discovered. It is very certain that a wet nurse has been known to render her nursling ill, or even to cause its immediate death, by suckling it when she herself has been greatly overheated by exercise, disordered by improper food, or rendered half wild with passionate rage.

Under all circumstances, a just regard to the interests of the patient demands that very judicious and precise instruction should be given in regard to the diet, dress, and exercise or labour of the sick child's nurse.

A child might be supposed to suffer an attack of laryngismus because it lives in a damp, unwholesome chamber or quarter; and as it is well known that the health of the child greatly depends upon the purity and the moisture or dryness of the air, as well as upon the light it enjoys, let a careful attention be paid to all these circumstances—changing a lower for a higher chamber, a damp and dark for a dry and well-lighted one, or one ill ventilated and close for one with abundant means of ventilation and light. Changes, indeed, of the residence from town to country, or from the river-side to the hills might very properly enter into the list of measures for the cure.

Children are often wrongly dressed. In my tract on dress, I have already offered some remarks that I shall not repeat in this place; but I beg the reader, who may chance to feel any interest in these notices of laryngismus, to turn to page 87, where he may find my opinions set forth as to this important item of management.

A careful attention should be paid to the state of the bowels, whose condition cannot but influence in a good degree that of the nervous mass of the child. A saburral state of the primæ viæ, or a condition in which the intestines are constantly vexed with acid or bile or obstructed with mucus, should be obviated by means of proper aperients.

An occasional dose of hydr. c. cretâ, followed by a portion of castor oil or by magnesia, or syrup of rhubarb, will be as likely to prove efficacious as any articles of the materia medica. When there appears no occasion for the use of purgatives or aperients,

the acidities should be counteracted by the exhibition of lime-water with milk or with some aromatic distilled water, or by means of a potion containing soda or potassa.

Should the attacks coincide with the crisis of dentition, the state of the gums should be observed in order to ascertain whether their tension and engorgement ought to be relieved by the use of the gum-lancet. There appears to me to be no necessity, nor even propriety, in the recommendation made by one author, who advises us to cut the gums daily, or even thrice a-day. I cannot believe that teething is the cause of laryngismus, however much it may conduce to favour the operation of the real causes of that malady.

Since the sudden disappearance or recession of certain eruptive diseases has been observed to precede the attack of nervous or inflammatory disorders, it is well, in those instances of this malady that coexist with crusta lactea or certain forms of impetigo, to be on our guard against the danger that attends their too sudden disappearance, so as to desist from the use of external applications calculated to repress the determination to, and nervous excitement of the skin.

I have no doubt resting upon my own mind as to the power of such affections as contravene the aeration of the blood to develop in the nervous mass a condition that may result in seizures of this strange malady, and of other very grave affections. Thus a chronic coryza or a moderate bronchial catarrh might, slowly and unsuspected, bring about an impure or imperfectly aerated state of the blood; that should be cured first, if we would at last cure the carpo-pedal spasm and laryngismus, of which it was the original basis.

In very young subjects, the sudden lifting of the Botalli valve by allowing portions of venous blood to escape directly into the systemic circulation might also give rise to a degenerate condition of the nervous substance. Let the child then be generally laid on its right side, not on the left.

In a child that enjoys good apparent health, except as to these periodical attacks, I should consider it desirable to draw blood by means of a few leeches applied at the upper part of the neck or upon the mastoid regions.

The uncertainty that must always exist as to the times of return, makes it doubtful whether we ought to employ the anti-

spasmodic remedies; and the same difficulty attends the exhibition of sulphate of quinine. Perhaps in this case, as in an ordinary tertian ague, we might avert the disposition to spasms and convulsions by straining the nervous power up to a certain degree of tension by means of the sulphate of quinine, if we could make any reasonable calculations as to the day or hour of the return. But young children will not well endure to take considerable doses of that drug for a long series of days, and the small doses we could safely venture to exhibit would probably prove of little avail.

I have directed, however, moderate doses of the fluid extract of valerian to be given several times daily for many consecutive days, and, as I suppose, with sensible advantage; yet not so great as to enable me to speak with confidence as to its efficacy. Still, as the therapeutical properties of the valerian render it one of the very best articles for a purely antispasmodic medication, I should prefer it to the others, and particularly to the assafœtida, which seems to disagree with the stomach, and to be at the same time too heating or exciting.

The iron by hydrogen is one of the most convenient tonics that we possess, and it is at the same time one of the most powerful, by its influence on the hæmatosis. My opinion that the nervous disorder is intimately connected with and dependent indeed upon a state of the blood and its delimitary membrane, the endangium, has induced me, where I deemed a tonic treatment desirable, to make use of this invaluable article. For a child less than one year old, only a very small dose of iron is required; and I have directed that a small portion should be allowed to adhere to the end of a moistened finger, from which it is conveyed to the child's tongue; in this manner, about a quarter of a grain may be given three times a-day, and that I deem to be a sufficient quantity, since I find that doses not exceeding two grains of the iron are quite sufficient to produce the most striking effects in adults. I believe that much benefit has been derived from the exhibition of iron as above, in one of the cases under my care. Still, I speak without confidence, and rather as suggesting a resort to the medicine than as advising its use from multiplied instances of its success. Few are the physicians who can boast or rather complain of being charged with the conduct of numerous cases of laryngismus stridulus.

I have, perhaps from long habit and use, great confidence in the efficacy as an antispasmodic and stimulant, of the oil of amber, and I advise the young reader, who may be doomed to experience the embarrassments likely to arise in every one conducting these strange mysterious disorders, to recommend daily frictions of the nucha and the whole interscapular region with oil of amber combined with laudanum.

If such a treatment should not prove agreeable to the practitioner, or should it be rejected on account of the disagreeable odor of the oil, let him cause daily the application of sinapisms to the spinal region—making the plasters sufficiently weak to avoid exciting too much pain or redness, and repeating them twice a-day or oftener.

Blistering plasters are so very painful to young children that I rarely bring myself to apply them, except when I vesicate the space behind the ear by a very narrow strip of the plaster, or a little blistering-collodium put on with a small brush. Indeed, I should not feel inclined to apply even the sinapisms, except when the frequently recurring paroxysms should have left their injurious traces in the pulmonary circulation or in the mucous membranes of the lungs.

The disease proves fatal by leading on certain disorders of the lungs, or by extending its pernicious influences to the hemispheres or the cerebellum; or else it instantly destroys life by cutting short the power of the medulla oblongata. The progress of the malady towards these several terminations, except the one last named, leads it through different phases of those complications from bad to worse. All that can be done here is to discriminate carefully the steps by which organs are successively invaded, and then trodden down and destroyed. If these processes are supposed to be congestive, or inflammatory, let them be opposed by the appropriate means, and that without too much regard to the prime disease, which, as I have supposed, is some derangement or dyscrasy of the nervous mass itself, a derangement and dyscrasy that increases, *pari passû*, with the successive failure of the organs under the dominion of that nervous mass. When the paroxysm is coming on, it should be treated by measures calculated to make it abort. Throwing cold water in the face is highly recommended; and since the sympathy between the diaphragm and the nerves of expression is well known, it is a most reasonable and useful

method. But I have witnessed attempts to re-establish the respiratory acts by dashing water in the face that utterly failed of any effect—so much so that the paroxysm has proceeded to the point of developing the general convulsion—a most untoward accident. I may with boldness aver my belief that the diaphragm will instantly act if a lump of ice wrapped in a napkin or handkerchief be applied to the epigastrium and moved over the arch of the hypochondria. There is scarcely to be met with a case of spasm of any muscle that will not relax upon such an application; and I am very confident in the correctness of the opinion I have already expressed, that our case is essentially one of phrenismus and not one of laryngismus. I ought to say that I here express only my own opinion, and that I do so with perfect respect for the opinions of others who differ from me in sentiment. Such an opinion, if founded in truth, cannot but be useful; if unfounded in truth, it can do no evil. Observations of diseases, and inferences deduced from such observations, are often erroneous—perhaps more often erroneous than correct and true; but how shall a man contribute his mite of truth or of suggestion towards the discovery of any truth, unless he speaks of what he seems to see, and of what he believes to be.

I have given in the treatment of laryngismus immense doses of laudanum—indeed, I have pushed the administration of opium so far as to feel doubts of the propriety of my action. But I have never seen the smallest advantage derived from the medication.

When the attack has gone on to the stage of convulsion, the warm-bath, as is usual, has been resorted to—but I cannot confidently say with very striking advantage. The convulsion, it is true, has come to its close while the patient was in the bath—yet it is to be supposed it would have done so without such recourse. Custom and probability of benefit will call for it, in all the cases; and I shall in all cases recommend it, as at least a harmless method. In fine, I believe our duty in the case consists, first, in making a correct diagnosis; 2d, in presenting proper explanations to the friends as to the prognosis, which is often unfavorable; 3d, in obviating the provoking causes, as swollen and distended gums, which are to be relieved by cutting them; 4th, in a heedful regard to the state of the bowels, whose faulty action needs correction; 5th, in directions as to diet, dress, exposure, and all that concerns the hygiene of the case; 6th, in the use of

counter-irritants and antispasmodics; in the exhibition of tonics, and in attempts to defeat the demonstration of attack by great quietude, and by applying cold to the region of the diaphragm; and, lastly, in conducting the paroxysm, when formed, to the earliest and least mischievous possible conclusion, by the warm bath and other prompt measures.

I have not, in any case, made use of venesection. My recollection of certain cases causes me to lament that I have not done so; and I shall, in any future occurrence of the kind, let blood from the arm should the patients exhibit such evidences of strength as some that I have attended. This nervous disorder is, in one sense, eclampsic; in a case of puerperal eclampsia I should never fail to bleed at the arm. In a strong and well-grown child of eight or twelve months, the same principle that should induce me to employ phlebotomy in an adult in convulsions might well and safely guide me as to the young child. The disease is one of the nervous mass, whose crasis depends upon the circulation, while the circulation equally depends upon that crasis. In such violent derangements of the forces of the nervous mass, perhaps the most effectual means of control are to be sought in venesection.

CHAPTER XII.

SCARLATINA.

There are three kinds, or rather three degrees of scarlet fever, which are severally known as scarlatina simplex, scarlatina anginosa, and scarlatina maligna.

Among the diseases of children there is, perhaps, not one that is more dreaded by parents and nurses than this most unmanageable affection; and I might, perhaps, with propriety add, not one concerning whose nature or treatment there exists greater uncertainty, doubt, and error.

It is very generally allowed by physicians and by the public that scarlet fever is a contagious disorder; and I presume that

those writers who take this view of it mean to be understood that the cause which produces it is a material generated within the body of a patient suffering from it, and from no other source.

No one has hitherto pretended, however, to know what the material cause of scarlatina is; though we have vague accounts of inoculations with it, that have proved successful in propagating the malady; but these accounts require confirmation.

The notion of the contagiousness of scarlatina, then, is one that depends upon faith or argumentation rather than upon evidence or proof. I do not conceive that we are bound to believe, because two or more persons in one company or household are seized with scarlatina within a certain time after communication held with a patient laboring under it, they acquired it from the said person—not even if the same sort of circumstance should be observed a thousand consecutive times.

Although it may be true that the cause of scarlet fever is a miasm, exhalation, gas, or substance, which is extricated from the bodies of the sick—yet if it is true, no one has hitherto proved it to be so. The most that can be said of it, therefore, is that it is in general supposed to be contagious.

It seems to me not reasonable to suppose that the sources of the poison (if it be a poison) of scarlatina are multifarious. For example, I cannot believe it is generated in the bodies of our domestic animals. If it is really a contagious thing, and produced, not in the domestic animals, but in man—then it is, in all probability, produced in man alone, and not in any other living thing or source whatever. That is to say, it is not dependent upon any vegetable or mineral substance, nor upon a hygrometric, electric, or thermometrical condition; nor upon any telluric influence, but is developed solely in the human economy, just as the human bile, human saliva, or the matter of human perspiration, are generated in man alone, and not in other creatures nor things.

Under this statement, it seems to me that many of us might well think we have right to doubt as to the contagion of scarlet fever, and not only conclude with the late Prof. Dewees, that the evidence of its contagion is imperfect, but wholly deny that it is so.

And one might well venture to resist the general assertion of its contagion, seeing that it so very often breaks forth fearfully in places where no suspicion of human intervention can be indulged, and that it often enters populous households, affecting only one or

two, and sparing three or six or eight other members of the family, even where not the slightest precaution against its propagation is taken by way of quarantine, disinfectants, or other means.

I have long been fully convinced that scarlatina is a non-contagious malady, whose cause is to be sought for in some intemperics of the air, or epidemic principle, of whose intimate nature I am, however, wholly ignorant. My own mind has for many years past been so fully made up on this subject, that I do not suppose I shall ever change it so as to believe that scarlatina is propagated by contagion. I think that I have come to this conclusion after very careful consideration of the subject, with which a medical life so long and active as mine has been, could not but have familiarized me.

While I thus express my own convictions upon this point, I hope I shall not be charged with any arrogance or any want of due respect for other writers, who, like myself, have merely stated their own impressions of the truth, but without enforcing their statements by any facts different from those of which I am cognizant. If any of those writers could have set forth such proofs of the contagion of scarlet fever as those which, in regard to variola, clearly prove its communicability from person to person, I should feel obliged to admit the facts—indeed I should not be able to resist the conviction of their force and truth.

In the case of scarlet fever, however, the facts are so discordant that every person is to be left free to form his opinions unbiased by the dogmatism either of the public or of medical writers and practitioners. It is certainly a very interesting question in practice as to whether scarlet fever be contagious or no. Those who insist on its contagiousness ought, in all possible cases, to separate the well from the sick, lest the dangerous contagion should, through their oversight, spread destructively among their charge; but, I conceive there is a far more interesting question to be settled relative to its nature—for upon our views of its nature must rest our methods of treatment. No empiricism can be safe in a case like this; a case, in which the life or the death of the patient must turn, not on a practice based upon a bare summing up of statistical returns, but upon a clear and philosophical view of the real nature of those deviations of function, and lesions of organs that give rise to the phenomena of the malady.

I wish to inquire, therefore, into the nature of scarlet fever to

learn what it is; in what part of the body it is seated; into the sources of the great danger that accompanies the onset of it, and the principles that ought to guide us in the treatment of it, as well as the method of fulfilling the indications of cure.

In order to do this, it will not suffice to say, as is so often said, that scarlatina is a case of poison in the blood—an expression which explains nothing, as, in fact, it means nothing. There is a deeper laid principle than this, which we ought to discover, and must know before we shall come to a correct analysis of our own thoughts as to the real nature of the disease.

Those of my brethren who have done me the honor to peruse certain of my medical writings, and a greater number of medical gentlemen whom I have had the privilege to address in my public lectures in the College, are already well acquainted with my views as to the generation and maintenance of the blood. As there may be some to peruse these Tracts, however, who have not read my Letters to the Class, nor my work on Obstetrics, I shall here set forth my views upon the subject at large. This I feel obliged to do, because I can by no other means claim to make myself understood, as to my views of the nature of scarlet fever.

The blood, which amounts in the adult to between five and six hundred ounces, is a fluid composed of water, albumen, fibrin, and disks, in the proportion of .790, .80, 127, and .3—taken in the order above mentioned.

The blood is wholly contained within the blood-vessels, which are arteries, capillaries, veins, and the heart. It is separated from the rest of the body by these vessels, and it maintains its nature as blood, only while it is restrained within their bounds. It is fair to say, then, that the whole of the blood is contained in a sac or cyst, which is multilocular—each tube or vessel constituting one cell of that multilocular sac or bag. It is proper to state that the blood becomes changed whenever and as soon as it quits the cavity of its vessels. When drawn into a cup, it coagulates, as it likewise does whenever it happens to be extravasated within the body; or, it is changed into the nutritive element of accretion or growth, whenever it is deposited as supply for the detritus of the living active organism.

This statement is undeniably true; and if so, the inference is good and sound that there exists a direct and vitally important relation betwixt the blood and the living vessel, inside of which

it is blood, but outside of which it cannot exist as blood—but, on the contrary, suffers immediate change or metamorphosis. I said there is a vital relation betwixt the blood and the vessel in which alone it can exist as blood. This is the same as to say that the nervous force of the living solid in contact with which the blood exists is a necessary condition of such existence. If that nervous influence is withdrawn or lessened, the blood coagulates or is ready to coagulate. In experiments, the blood is found to coagulate when the nervous force is withdrawn by pithing the spinal cord. I think there is no reader of this passage who will not agree with me as to the truth of these propositions. But the question arises as to what is the blood-vessel; what is this organ, that alone controls the life and all the qualities of the blood, and which the blood touches alone, and by which the blood is restrained from soaking into, and infiltrating the whole body and converting the tissues into what might be called one universal mass of ecchymosis?

It would scarcely be just to say that the blood-vessel is the elastic tissue which we find in the arteries, or the muscular, or the cellular elements that are found in different parts of the sanguiferous apparatus.

The truth is, that the true blood-vessel is that tissue which the blood touches, and that is the one called by the anatomists *membrana vasorum communis*, which Mr. Burdach has denominated (and I humbly after him) the endangium, or inner lining of the vessels. I say that the endangium is the true blood-vessel, since it alone penetrates into the interior of the organs, always leaving the other coarser coatings on the outside, when it alone goes within them to carry the blood for their supply. The endangium may justly be denominated the blood-membrane, because it either makes the blood by transmitting to its elements the nervous force, or because it maintains the blood in a living state by its presence and contact. I shall not say that the endangium makes the blood by its sole force of innervation, but while I refrain from saying so, I beg leave to express my inability to discover any other solid besides the endangium, to which I can attribute this power; because, if, as is true, the endangium is the only solid that the blood touches, it is clear that it is the only solid by or through whose agency the force of the nervous mass can be communicated to the blood. It is not necessary to raise the question as to whe-

ther the endangium is in reality organized. It suffices that it is the proximate solid as far as the blood is concerned, and that the nervous force must be transmitted through it.

I do not mean to deny the changing and plastic powers of cells; on the contrary, I freely admit that cell-life is an absolute force. But it is also true that cell-force cannot be exerted save under conditions relative to the cell.

Even if we suppose that blood-disks are really cells, endowed with all the powers of cell-life, it is nevertheless true that the necessary conditions of existence of such cells are conditions immediately related to the endangium.

Should this statement be found correct, then it will necessarily follow that states of the endangium must influence the blood; that, the endangium being in perfect health and vigor, or the reverse, the blood will be healthful, or the reverse.

The new light shed on the nature of phlebitis, and particularly that form of it which is known as crural phlebitis, as well as those cases of phlebitis that follow wounds of veins in venesection, in amputations, &c. &c., has rendered it clear that the lining membrane or endangium may be affected with various forms and degrees of inflammation, and other pathological conditions.

In these cases of endangitis we have frequently to observe masses of coagulated blood adhering to the walls of the vessels, or great deposits of exudation-corpuscles within the membrana vasorum commune, vast accumulations of pus within the vascular canals, and other results of inflammatory action.

This being admitted, it appears to me to follow that this endangium, this blood-membrane is the subject, and indeed the frequent seat of pathological modifications that cannot but interest the constitution of the blood or its crasis, and so, its conditions cannot but exert a great influence upon the health of the individual.

In chlorosis, or the various forms of the anæmical malady, the endangium may be considered as too debilitated to maintain the blood in its due crasis, which being lost, the result is the manifestation of signs of the chlorotic malady.

Another condition of the endangium is concerned, under this hypothesis, in the evolution of a great excess of the fibrin of the blood, which being in health, as .003, may rise in certain instances as high as .015.

In another state of the endangium the disks, which in health stand at .127, may rise to .140, or may fall to .030, while the water may rise from .790 to .890.

In certain other conditions, the endangium becomes an organ secreting pus, or a pyogenic organ, whose fatal function it is to infect the whole mass of the blood with pus-corpuscles.

If it should be said that all these variations depend on varying conditions of the nervous force, I admit that it is so; but, I claim that as the endangium is the delimitary membrane of the blood, the screen, so to speak, that separates it from the body, and its only medium of communication with the body, the nervous force is transmitted by it to the blood—it is the organ of that nervous force—in the same sense as the retina is the organ or machinery of the tubercula quadrigemina or visual brain, or as the organs irradiated by the vagus are the organs or machinery of the medulla oblongata.

All organs should be regarded as negative poles of parts known or unknown of the nervous mass, whether brain, spinal cord, ganglion, or plexus. In this sense, I propose that the endangium be regarded as the organ of the nervous mass, for the transmission or communication of the nervous force to the blood; in other words, as the organ that produces the blood.

Having set forth my views as above, I have now to say that scarlatina may be considered as an inflammation of the true blood-vessel, or endangium, the inflammation being chiefly observable in the capillaries of the skin, of the mouth and throat, and of the nostrils. In some of the cases the inflammatory affection seizes upon the capillaries of the brain, more rarely, on those of the stomach and bowels, &c.

Seeing that the skin is an organ of vast extent, exceedingly vascular, and possessing important relations with the rest of the economy, we need feel no surprise to observe the constitutional disorder produced by so extensive an inflammation as that of the whole derm. As the crasis of the blood depends upon the healthful force of the endangium, it is to be expected that violent and extensive disorders of the endangium shall produce great changes in the crasis of the blood, and that those changes will exercise a pernicious influence throughout the economy. The nervous force, dependent as it is on the power of the blood to be charged with

oxygen, fails under such conditions of the vital fluid, and the organs and functions, in succession, become overthrown.

The skin is not only the general envelope of the body, and an organ by means of which a great quantity of carbon is eliminated, it is also an organ for the secretion of a considerable amount of sebaceous matter, and for the discharge by perspiration of a large proportion of the watery element of the body, &c. Lastly, it is everywhere an organ of sense, since there is no point upon its surface that is not endowed with the sense of touch. All these circumstances, as well as common observation, show that it is liberally supplied with nerves, most abundantly endowed with capillaries, and moreover possessed of a remarkable power of coacervation, which, whether it be of the nature of muscularity or not, is undetermined and unimportant for the nonce.

I should think that, reflecting upon the anatomical characters of the skin, no person, observing the intense color of a disk of skin affected with the inflammation of scarlatina, or noticing the rapid flushing of the red tint back upon a part from which the circulation has been driven by pressure of the finger, could deny the existence there of an active inflammation. Yet it is clear that this inflammation does not attack the whole cutis, but only its outer or papillary layer.

If such a great inflammation should attack both the papillary and the cellular aspects of the cutis, we should have the proofs of it not only in severer pain, but in positive thickening of the whole derm.

In scarlatina, however, the skin retains its ductility, its softness, and its natural thickness, from whence the inference is good that the inflammation is limited to the outer aspect, or what has been called the corpus mucosum of the organ. It ought to be observed that such an inflammation greatly modifies the condition and powers of the sudoriferous and sebaceous glands as well as the power of exosmose of the whole exterior layer.

But if this be a real inflammation, what is it that is inflamed? What is it that gives the scarlet hue? What is it that causes the red color to flush in an instant back again in the capillary tractus from whence we may have just forced it out by pressure of the fingers?

To me it seems that not the papillæ only are inflamed, but the channels that carry the blood to the whole outer aspect of the

organs; and those channels are capillaries whose essential physical solid is endangium and naught else.

There are very few cases of disease that meet the eye of the physician, whose sequelæ are more characteristic of the anæmical malady than scarlatina.

It is generally followed by remarkable paleness, long debility, readily excited palpitation, œdema, endo-cardial symptoms, anasarca, dropsy of the chest or belly, and other derangements, that cannot with reasonableness be assigned to any other causes than a vitiated condition of the blood-making faculty; and, in fact, it generally happens that, after the close of violent assaults of scarlatina, our attention is called rather to the condition of the hæmatosis than to any other pathological problem.

Many individuals, be it remarked, assailed with scarlatina, in the form called malignant, can never succeed in getting the skin inflamed; on the contrary, it is rather dead than inflamed—it is engorged and overwhelmed with torrents of blood that it cannot transmit—so that, when a finger is pressed upon it in a manner to cause a white mark to remain, many seconds elapse before the dark carbonated and half grumous blood in its capillaries is seen slowly to creep or rather soak back again in the capillary tractus from which the pressure had chased it out.

In some of the cases, the skin acquires from the first a deadly paleness, the extremities being cool or cold, while the pulse cannot be counted for its frequency, and is a mere thread at the wrists. But, the child meanwhile is perishing from the frightful inflammation of the fauces, the pharynx, and the larynx. In this state the brain seems, in some instances, intact, since the intelligence is wholly unperverted.

I presume that here the endangium of the heart, the endocardium, and that of the aorta and the superior or inferior cava, is the seat of the endangitis, and not the endangium of the cutaneous vessels. This is what the vulgar call a case of scarlet fever struck in—a recession of the malady from the surface to the interior of the body. But what is the meaning of struck in? Does any one suppose that scarlatina, like gout, is metastatic? It is not a case of eruption struck in; but of an original attack of inflammation of the great central vessels, under which the central organs become incompetent to their office or function.

Is scarlatina a case of poisoned blood? I cannot comprehend how the cause of scarlatina should poison the blood.

Many of my friends have said, while we have together attended upon cases, "the blood is poisoned;" "the poison is in the blood;" "the disease is a disease of the blood, which has received its fatal dose of the poison." For my own part, I do not admit that there is any poison in the case; for I deny the contagiousness, and believe in an atmospheric intemperies as causative of the malady.

If we should say, and truly, the blood is poisoned, I see not how scarlet fever should result from it. A narcotic may poison us, but it does so by poisoning our nervous mass, which is our only sensible mass. Thus, over-doses of belladonna, by their influence on the nervous mass, may give rise to symptoms so like those of scarlatina, as to be likely to puzzle the diagnostics of the most adept physician who should be called to judge of the case from the symptoms only. In a time when scarlatina should prevail, he would scarcely avoid attributing to scarlet fever poison the red sore throat, and the scarlet rash, the vertigo and heat, and the rapid pulse that might come from over-doses of belladonna.

In many instances we find irremediable depravations of the blood manifested, not only in the color of the tissues, in the temperature, or the pulsations, but also in the psychical disorders introduced by it. These psychical affections, as I have many times noticed them at the bedside, have appeared to me to be identical with those I have often had sad occasions to observe in the pyogenic fevers of puerperal women, and in purulent infection of the blood from phlebitis or endangitis in men, whether arising idiopathically, or whether resulting from wounds in veins, or phlebitis extending from heterologue disease of the abdominal cavity.

In relation to the morbid changes suffered by the blood, I shall here cite a passage from M. Gerber's *Gen. Anat.*, p. 302, one which I quoted on a former occasion in a paper read before the Philadelphia College of Physicians, but which confirms so fully my own opinions that I may very properly presume to lay it before those who may do me the honor to peruse these Tracts:—

"Various and very dissimilar causes," says M. G., "may bring about coagulation of the concrescible fluids of the body, the chyle, the lymph, the blood, and some of the products of glandular secretion. Among the number of these causes, may

be reckoned: loss of the solvent medium, particularly the water; greatly retarded motion or absolute stasis; the admixture of chemical reagents absorbed along with the chyle, the lymph, &c., such as acids, salts, pus, mucus, ichor, &c., or that penetrate from neighboring parts in virtue of the law of endosmose. To these must be added mechanical causes; injuries of all kinds, pressure, bruising, solution of continuity; and further, the influence of unusual temperature—exposure to excessive heat, severe cold, &c."

In taking the view of scarlet fever that I have now endeavored to set forth, I find myself, in practice, freed from the necessity of fatiguing my mind in the vain search after a rationale of the symptoms, and a discovery of the indications of treatment.

I have no poison in the blood to eliminate—I do not perceive a state of the liver that requires calomel as an alterative. It is not a pneumonia nor a gastritis, or duodenitis, or dysentery, or nephritis that I contend against—but I find in my scarlet fever cases a vascular disease, an inflammation of the endangium. If it be the capillaries of the skin that are solely affected, I have to treat a mere case of scarlatina simplex. If those of the skin, and those of the mucous membrane of the fauces only are attacked, then I have a scarlatina anginosa. If the skin, the fauces, the Schneiderian membrane, the larynx; and, *à fortiori*, the parotids, the heart, the lungs, the stomach, or the encephalon are all together involved by the inflammation of their capillary endangium, then I have a case of malignant scarlatina, and I know that the major part of such cases are mortal ones.

Now, in these three different forms or grades, I see only the same disorder; but I see it rising in importance from the slightest attack of simple scarlet fever up to the terrible intensity of the most malignant form, merely by the extension of the inflammation to the endangium of deep-seated and vital organs whose play is necessary to life, which cannot be rescued when, as in too many instances, the violence and extent of the disorder transcend, *ab initio*, the powers of recovery.

But even in some of the cases of scarlatina simplex, the blood capillaries of the derm are so severely inflamed as to give rise to the most intense constitutional irritation. It may well be supposed that some of the samples of scarlatina anginosa will, *à fortiori*, be found dangerously violent.

This state of the membrana vasorum, by its influence upon the health of the blood, exposes the patient to many of the dangers referred to in my extract from M. Gerber's *General Anatomy*. In the instances where the pulse can scarcely be felt or counted, when the heat of the trunk is not great, and that of the extremities below par, the surface livid, the respiration rapid and violent, and the breath cool, I believe the nervous power, whose transmission to the blood through the endangium is indispensable to its existence as such, being greatly impeded, the blood tends to coagulate, and that the conditions just now referred to do often depend on the formation of a coagulum in the heart. There is, indeed, good reason to suppose that the heart-clot is one of the chief direct causes of the loss of life in scarlatina. In many other kinds of sickness, such as phthisis pulmonalis, cancer of the stomach, or liver, vast tumors of the ovaria or womb, small-pox, &c. &c., the flying pulse that we meet with in the last days of the patient's life is due to the presence of a clot formed in the pulmonic heart and pulmonary artery. The presence of such a clot is not difficult of diagnosis, as will be witnessed by many students of the Pennsylvania Hospital, who have verified that diagnosis as made by my esteemed colleague and friend, Dr. William Pepper, during his clinical lectures at that hospital.

All the conclusions of medicine, being designed at last to turn to the account of the safety or advantage of society, the present Tract ought in like manner to include some directions or inference of a clinical kind. And here I am free to confess that the views I entertain on the subject of our disorder, do not liberate me from a sense of doubt and even of incompetency when I come to assume the conduct of a case of scarlet fever.

It is far easier to know diseases than to know how successfully to cure them; because, it has not pleased the Author of nature to supply us with therapeutical agents capable of effecting those changes in the action of the organs that we should most thankfully possess if He had designed or given them to us. Nevertheless, to cure does not really mean to restore, but rather *curare*, to care for, to take care of, to counsel and to execute as far as in us lies, those things that may tend to the recovery. These attempts are, alas! often vain attempts, though in the majority of them we reasonably expect to see the good fruit of our labors in behalf of suffering humanity.

The cure of the milder forms of scarlatina is very simple. There are many such instances in which the patient is ill only as far as the dermal covering is concerned; and when the inflammation of the papillary aspect of the skin is not violent, it often suffices to make use of mere hygienic measures.

If the pulse is not very frequent, or full—if the head is clear, the respiration moderate, the temperature not greatly augmented, the intestines not overloaded, there is no clear indication for the prescription of any drugs.

In treating the sick, we ought always conscientiously to avoid the administration of drugs and medicines in the cases wherein we have not a clear call for them. Indeed, it seems to me something criminal to give physic to a patient without a clear and express understanding of the motive for exhibiting it. Hence, though the patient may be affected with scarlatina, it does not behoove us to drug him merely because he is already sick. We ought to wait, and watch, in order haply to learn whether the disease is about to seek its own fortunate term without our aid. If, in a case that tends to a spontaneous cure, we interfere with the salutary march of nature, we shall prove to be rather disturbers than pacificators of the rebellion of the organs, and shall be more likely to give an unfavorable turn to the case than to lead it to an earlier, an easier, and safer conclusion.

Let the young reader take notice of a fact that is worthy of his careful attention; it is this, that men of experience, and long and deeply versed in the treatment of diseases, give less and fewer medicines than the young and new-fledged practitioner.

It is quite a mistake, and a very common one, both in the young profession and in the public, to say that when a man has come to a mature age in his career of practice, he has lost his energy, because he confides less in the power of drugs than at the commencement of his medical life. The fact is almost universal that experienced physicians give less physic than the young and ardent practitioner just out of the schools; and this fact, I repeat, is worthy of note, and should be used as a beacon and guide for the new beginner. The diminished use of drugs does not arise from any mistrust of their real beneficent powers, but from a truer and more perfect knowledge of the indications. Let him not join the hue and cry of "Go up, thou bald head!—go up, thou bald head!" and let them remember the she bears that "tare

forty-and-two of those children" that derided the gray-haired prophets of God.

To establish by vaccination an inflammation extending from the elbow to the shoulder, and involving half the circumference of the arm of a child, does not awaken the immediate desire to cure it by drugs. On the contrary, everybody is content to wait in order to see its spontaneous decline on the tenth and its complete cure on the eighteenth day: so, in many cases of fever, scarlatina, measles, &c. &c., it is our sufficient and whole duty merely to watch over and observe the progress of affairs, taking care like the consul *ne quis capiat detrimenti reipublicæ.* Hence, I urgently advise the young practitioner to take courage to resist his impetuous temptation to prescribe medicines, merely because the child is sick. In the meantime, let the temperature of the apartment and the body be regulated—let the diet and drinks be wisely ordained, and we shall often find that, if we decide to avoid the use of doses for only four hours, or eight hours, the fever will in that space of time have considerably decreased, while the various organs of life have in the meantime taken no detriment. In eight other hours, we may discover a great diminution of the signs of disease, leading us to expect the total disappearance of the malady in due, and that no very long time.

Nothing can prove more gratifying to a medical man than the results obtained in this manner. The success commends the method to the friends of the patient, who with a little instruction from the medical adviser, may be readily led to understand the reasonableness and the wisdom of such a method. A physician who dares to make such a prognosis and recommend such a course of action, obtains the entire confidence of those with whom he has these professional relations, and they truly learn to confide not only in him but in the MEDICAL ART.

It is not, however, in every case that we can feel ourselves safe in confiding to nature alone the restoration of the patient.

If the pulse has risen in frequency, volume, and force, to such a degree as to extricate an excessive temperature; to render the patient restless; to give him general pain, affecting the head, the trunk or the limbs; to accelerate the respiration in an inordinate manner—if the stomach has become disordered, with nausea, or vomiting, or if the alimentary passages are loaded with the residue

of digestions retained too long, we shall not feel at liberty to wait upon the movements of nature.

In every instance we ought to inform ourselves whether the increased general momentum, or any morbid determination of the circulation, menaces the life of the patient; and if we arrive at the conclusion that *such* a state of the circulation is dangerous, measures ought to be taken with a view to moderate the impetuosity of the motion.

In some instances, the operation of an aperient enema may be relied upon as sufficient to diminish in a decided manner the violence of the circulation, the excess of the respiration, and temperature.

In other examples, the more considerable influence of an aperient or purgative medicine is required, for the purpose of producing not only a direct sedative result from the increased secretions into the cavity of the bowels, but also for the indirect advantage derived from the removal of saburra, the presence of which provokes even a higher degree of irritation. Even where we have no reason to suppose the presence of saburra, we ought, if the fever is great, to remove the ordinary contents of the bowels, because it is true that those ordinary contents, which in an ordinary state of the health are not morbidly irritating to the intestine, become highly so, in fever, under which the sensibility of the alimentary tube is greatly exaggerated.

In addition to the sedation derivable from the operation of an aperient or mild cathartic medicine, a most useful end, of the same sort, is obtainable by means of the affusion-bath.

I have the greatest reason, I think, to recommend the use of the affusion, and am indeed so much convinced that it is one of our best remedies, that I have rarely failed to prescribe it for my scarlatina cases during the last twenty years.

A large wash-tub should be brought into the chamber, and the floor of the tub should be covered with a folded napkin, in order that the child's feet may not rest upon the cold wood.

The child should be placed on his feet in the tub, and supported in a stooping posture—when three or four gallons of water, containing a portion of vinegar and of the temperature of 92° or 94°, should be poured upon the nucha and shoulders so as to run off at the feet.

As soon as the affusion is completed, the child should be

wrapped in a flannel dressing-gown, without wiping the body. It is then laid upon the bed, and after twenty or thirty minutes is dressed again in its night-clothes.

It appears to me that this method of using the bath is far preferable to the ordinary plunge-bath, which is likely to irritate and fatigue the little patient; whereas, the affusion at 92° while the body is at 98° or 100°, produces a delightful refreshment and coolness to the heated surface. Certainly, it often happens that, children heated, distressed and agitated with fever, become at once tranquilized by this process, and soon enjoy a refreshing sleep after being laid upon the bed.

Many years ago, I saw a child seven or eight years of age, lying, as I thought, dangerously ill with scarlatina, in Race street near Ninth. Its skin was red as a lobster, and it was restless and unhappy. I directed the affusion as above. The child received the bath with the greatest satisfaction, was laid upon its bed—fell at once into a copious perspiration, which in less than six hours removed every vestige of the fever, and even of the scarlatina. The case was cut short by a single affusion-bath. I have not since that time met with another example of so prompt a cure by similar means—but I certainly have met with numerous examples of striking benefit procured by this method in cases of scarlatina of the several grades.

I have on many occasions commenced the treatment of scarlet fever cases by the exhibition of an emetic of ipecacuanha. It seems probable that such a process would prove very salutary where a saburral condition of the primæ viæ is clearly ascertained to exist; and particularly in those instances in which a considerable accumulation of faucial mucus gives an unfavorable prospect as to the state of the throat in the case. I have not, however, of late years been so much in the habit of exhibiting emetics in this malady; still, I believe the plan is a commendable one, which ought not to be overlooked or neglected so much as I suppose it to be by the brethren generally. Little violence is done, and little exhaustion produced by the emetic dose of ipecacuanha, or powder of alum.

In general, the inflammation of the papillary body of the skin involves the secretory organs of the derm, so that both the unctuous and perspirable matters fail to be discharged. In consequence of this dryness of the surface, it is usual to prescribe

saline draughts and other medicines designed to increase the perspiration. These saline mixtures, in general, serve more to disorder the stomach than to promote diaphoresis, even in some of the ordinary bilious fevers; but in such diseases as scarlatina they are really pernicious, since it cannot be reasonably expected that they should produce their diaphoretic effect on account of the inflamed state of the organs of the perspiration. Certainly, those persons who take saline mixtures without being cast into a perspiration by them ought not to expect any good effect—but rather, an uneasy state of nausea, which results in no good. Such articles appear to me to be sedative or calming only in those instances in which sweating follows their employment, an event that is at once improbable and very uncommon in scarlatina.

To perspire freely in scarlatina, is almost to insure a happy recovery; because the outflowing of the perspiration tends directly and powerfully to the diminishing of the dermal inflammation.—But while that inflammation is maintained at its high stage by the strong reaction of the heart and arteries, there is little hope to establish such a critical flowing of humors from the pores.

A far better medicine than the saline draughts so generally used, is to be found in a very dilute solution of emetic tartar, of which the one hundredth or one hundred and fiftieth of a grain may be given to a child two years old. Half a grain of emetic tartar, dissolved in a common tumblerful of water, may be given in teaspoonful doses once an hour, which might be assumed to be the 130th of a grain for the dose. Such doses are powerfully sedative by their influence upon the action of the heart, which rarely fails to become less violent and impetuous under the use of the drug. To let the action of the heart fall even a little in intensity is to allow the re-establishment of the perspiration, especially if the therapeutic operation be assisted or promoted by means of occasional affusion-baths, or by sponging the whole surface with water at 85° or 90°.

If the heart beats strongly and frequently, the blood is driven with force and swiftness into the tissues of the organs, and those that happen to be the seats of an inflammation become overcharged or engorged—heated, extended, reddened, and more painful. If, on the contrary, the heart can be made to beat with less force and frequency, then the blood reaches the organs with less impetuous force and in smaller quantity in equal times; in which case the

parts inflamed become less heated, extended, red, and painful—which is, to all intents, a lessened degree of inflammation.

Now, these propositions are so obviously true that I do not understand how they can by anybody be denied or rejected; and yet it is a very common thing at the present day to discommend the use of venesection in scarlatina. Scarlatina, as I understand it, is inflammation of the blood-vessels of the derm—or, to use the expression that I prefer, it is endangitis of the cutaneous vessels. Nobody denies the usefulness of the lancet in inflammation of the pleura or meninges of the head, yet it is quite a general thing to make an outcry about bleeding in scarlatina.

If a venesection may at once lessen an inflammation of the pleura or peritoneum, it seems to me that a similar method might be expected to have a similar effect in an inflammation of the skin.

It is undeniable, that in the great cases of phlebitis (even in metro-phlebitis), the use of the lancet has not gained much favor in modern practice; a circumstance that depends rather upon the too late determination of the diagnosis, than upon any peculiar inapplicability of that method to the form of disease. Patients affected with phlebitis do not exhibit the symptoms of that malady until they have gone very far in the course, and when those symptoms are at length observed, it is often too late to expect a cure from the lancet. I speak here of those cases of phlebitis that affect the larger vessels, such, for example, as crural phlebitis or milk-leg. In such instances, the disease is rarely understood until the crural vessel, or the vessels of the saphena-system have become enormously swollen by the secretions, or inflammatory exudations, not of the endangium only, but of the cellular sheath outside of the real vessel; venesection in such a state of the case would not be more reasonable than a bleeding in pleurisy or peritonitis after effusion should have taken place.

A similar objection does not appear to me to exist as to the use of venesection in the endangitis of the cutaneous vessels in scarlatina—in which it is rare to find effusion or any exudation. The control exerted by a proper bleeding over the *ictus cordis*, is sufficient, as I have already observed, to lessen the force of the injection-power of the heart in the most salutary manner. I think that I speak from a very ample experience of the fact.

That experience has, during many years, confirmed me in the use of venesection in scarlatina.

The prostration of the vital powers observable in the more malignant forms of scarlatina is so great in some of the instances, that it is clear at the first glance that the lancet is not the proper remedy; because, as the lancet is designed to control the power of the heart, or the injecting-power, we dare not resort to it where we find that power already reduced almost to its last remainders.

I am of opinion, however, that in these dreadful circumstances, which forbid a resort to venesection, there remains little hope in any other medical recourse; and my clinical experience leaves upon my mind a strong impression, that in a case in which I should not dare to let blood, I should not expect to have the happiness to see the patient recover. These expressions do not imply that I should let blood in every case—for there are many of them in which I should not think it necessary to bleed, because I should foresee the end, in a perfect recovery, under the use of a few affusion-baths, occasional draughts of cold orangeade or iced-water, and sponging of the surface; while I might keep the bowels in proper condition by means of laxative enemata, or some gentle aperient doses.

I have had many occasions to regret and mourn over my own timidity, or that of my medical brethren in consultation, because, when I have wished to bleed, but dared not—or have proposed to bleed, but could not on account of objections made to it in consultation, I have seen patients lost that might probably have been saved. But I have rarely seen recoveries to take place when I wished to bleed, but dared not, or could not.

It is a great matter to keep the respiration clear—because without oxygen we die. But a child in scarlatina anginosa or scarlatina maligna would die outright, from the obstruction of his respiration through the vast collection of tough faucial mucus, that is ever found filling the fauces and pharynx of the young patient, in our disease.

It is, therefore, a matter of the extremest necessity to clear out for the child not the fauces only, but also the nostrils.

The fauces may pretty readily be kept free by removing with a bit of sponge secured on the end of a pencil-stick, all the mucus that may be collected beyond the isthmus faucium, even far down in the pharynx. Upon removing a great mass of tenacious phlegm

in this manner, the restlessness is instantly lessened, because the partial suffocation, caused by the churning of the inspired air through the mucus, is removed.

It ought not, however, to be overlooked, that a young person retains the instinctive propensity to breathe only through the respiratory orifices, the nares; and there is little advantage in thus removing the faucial mucus if we neglect at the same time to clear out the nostrils. For this purpose, I have found great convenience in using slender cones or cylinders cut out of a very compact sponge. If these cones are made about an inch or inch and a half long, one of them may be, readily and without pain, spun betwixt the thumb and finger, deep into the nostril, where it absorbs and entangles a quantity of obstructing mucus, which is then withdrawn.

It stands to reason to say, that a child, half choked or asphyxiated by obstruction of the nostrils and fauces, shall be greatly comforted, and in a measure preserved from danger by the above method. I at least, am confident I have rescued patients by this means, that I could not without it have saved.

To touch the diphtheritic surfaces of the fauces in scarlatina, with solutions of nitrate of silver, is a very common practice. I am impressed with the conviction that it is not useful in these instances to make use of strong solutions of the salt. They do not answer a good purpose; nor can they cure the malady, which is essentially endangitis of the derm and the throat. It is far better to use weak solutions, not exceeding three to five grains to the ounce. Such doses do not give pain, nor do they excite another inflammation; whereas, the concentrated salt produces an inflammation of its own, that is immediately again converted into the morbid, and thus aggravated inflammation of the scarlatina. It is a pure loss therefore to excite it, and the act serves but to aggravate and not to cure.

Perhaps other physicians may think differently on this point. Still, I desire here to do my duty in humbly offering them this suggestion, and commending it to their careful observation and reflection.

In some very severe attacks of the scarlatina-diphtheritis of the throat, I have allowed of no gargle except very cold infusion of lint-seed, which is always comforting to the patient.

Honey of roses, with a little alum, or with borax, is a very

serviceable gargle; as is likewise a mixture of sulphate of quinine and sulphate of copper, dissolved in water, and applied by means of a throat-brush. A scruple of quinia and half a scruple of the sulphate of copper, dissolved in an ounce of water, is a convenient formula.

The throat should be dressed with a poultice of flaxseed and hop-petals, wrapped in the finest flannel, and worn as a cravat.

A patient in scarlatina ought not to be blistered. The inflammation excited by a blister is more apt than not to be instantly converted into scarlatina-inflammation, so intense as to transcend the power of recovery, nor to terminate in any other way than that of gangrene and mortification. I have seen the whole corium covering the front of a baby's thorax, fall out in one slough, for having been rashly covered with a blistering plaster. These blisters are most pernicious things in our cases.

It appears to me that most of the cases of scarlatina that have proved fatal under my observation, have destroyed the patient by developing pseudo-membranous croup. Those, however, that perish within the first forty-eight hours die apoplectic.

Parotid tumors, or rather swellings, which are mumps—scarlatina-mumps, are of very bad omen. They add frightfully to the pain and tension of parts, and are generally complicated with similar swellings of the submaxillary and cervical glands.

I never saw a patient recover in whom the parotid had gone into suppuration. I believe that the best thing to be done in such circumstances is to adopt the practice of my friend Dr. Corson, of Conshohocken, as advised in his letter to Dr. J. F. Meigs. That letter may be consulted in Dr. Meigs' work on the Diseases of Children.

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